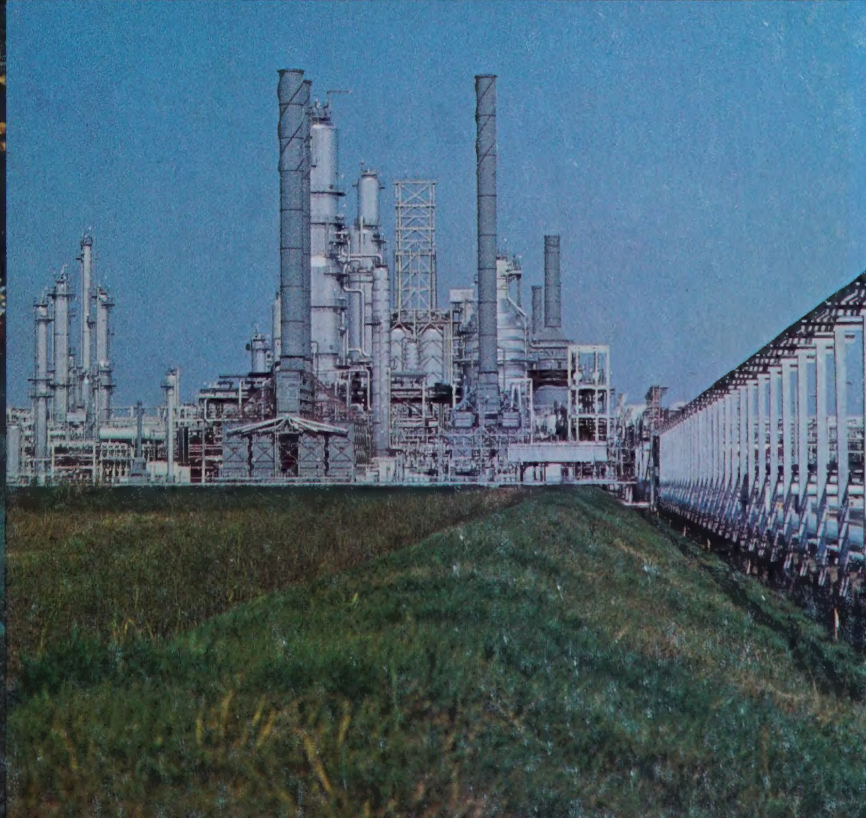




GULF OIL CORPORATION
1973 ANNUAL REPORT

**SPECIAL ISSUE OF
THE ORANGE DISC
MARCH · APRIL 1974**

AR39



THE SIMPLE ART



OF BRINGING IN THE OIL

The world's costliest underwater wildcat real estate lies on the floor of the eastern Gulf of Mexico.

In last December's Federal sale of submerged lands off the coasts of Mississippi, Alabama, and Florida, the highest offshore bids ever made—\$212 million and \$127 million—went for two 5,760-acre tracts off the coast of Florida. The per-acre figure for the top bid was \$36,805.

In spirited bidding, 61 oil companies, teamed into combines to split the costs, took 87 tracts, netting the Federal treasury \$1,491,065,231. Gulf and partners came out well. Of 26 tracts bid on, Gulf won 17 in partnership and picked up an 18th tract alone. The various Gulf combines spent \$370 million. Gulf's share was \$174 million.

Although offshore drilling was pioneered in the 1930s off Louisiana, and much of modern offshore technology has been developed there, the neighboring waters of the eastern Gulf have remained essentially virgin territory. In the December sale of leases, the largest cluster—35 contiguous tracts—lies partially over the promising Destin dome structure south of Panama City. The remainder lie scattered in smaller clumps from south of Biloxi to west of Tampa. Gulf and its joint owners, who are well placed across the spread, are now tooling up to see what lies beneath the mud.

Once again the vast array of men and materials and the specialized equipment and expertise of the oil industry are being assembled for that most exciting challenge to an oil man: the exploration of wildcat country. And once again—and with more than the usual spectator interest—the public will watch the progress reports, the box score of dry holes and wildcat discoveries and "barrels per day," in this latest search for what has become in our century a maximum need.

It has been estimated that production could start in the eastern Gulf as early as two and one-half years after the first discovery—but only if pipelines are run to shore from the first platform. (No production may be barged to shore in the eastern Gulf.) If the operator deems it necessary to adopt other alternatives for operating the field, production could wait up to five years after a discovery.

The all-important discovery itself (which, it must be remembered, is totally unpredictable) will also have to wait on events that must precede even looking for the oil.

With expectations at an all-time high, it might be well to spell out just a few of the major steps needed to convert a stretch of ocean wilderness into a producing oil field.

Considering the massive investment involved, no search for oil is even considered without extensive geophysical surveys. These investigations often occur long before a lease sale. In fact the results of seismic exploration may inspire a sale. And their interpretation will directly influence the strategy of the bidding, not to mention the strategy of the search.

In Gulf's operations, the geophysical vessel GULFEX has run more than two hundred thousand miles of seismic soundings on various continental shelves of the world. From a two-mile cable strung out behind the ship, hundreds of sensitive hydrophones pick up small-amplitude pulses reflected off subsurface strata. Information streaming in is recorded on magnetic tape which is sent under tight security to Gulf's Houston Technical Services Center (a branch of the Exploration and Production Department of Gulf Research & Development Company).



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OF BRINGING IN

THE ORANGE DISC

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On the front cover we show (clockwise from upper right) a rig drilling in the Mackenzie Delta area; coal being shipped from Pittsburgh & Midway's mine in New Mexico; Alliance Refinery; the tanker CHUN WOO at El Ferrol shipyards in Spain; Reston, Virginia; and a drilling well; the back cover, upper right, Fort St. Vrain, nuclear power plant, north of Denver; left center, a compressor station offshore Louisiana; right center, drilling rig, Fort Stockton, Texas; bottom, right, Reston, Virginia; upper left, Venice Refinery on the Mississippi; and a drilling rig in the Gulf of Mexico.

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HTSC processes the seismic reflections with the aid of high-speed digital computers. By meshing the reflection data with any available gravity or magnetic data, a complete geophysical interpretation of the subsurface environment is produced. Three-dimensional pictures are constructed to show the indicated geologic structures favorable for oil and gas accumulation.

Meanwhile, once the lease is obtained, a more grass-roots homework begins behind closed doors at Gulf's New Orleans District Office. Working not from magnetic tape but from penciled notes, experienced geologists and drilling engineers carefully evaluate available information from any test holes drilled in the general area of new tracts. In the eastern Gulf, no offshore wells have been drilled in the vicinity of the new leases but various companies, including Gulf, have drilled onshore. Through careful homework, the Company's specialists acquire facts about onshore wells to assist them in estimating first-hole costs for the offshore, and to plan the design of rank wildcats. Their data include the spudding-in date, when casing was set, and at what depths; what sort of subsurface formations were encountered and whether special casing was required; the mud weight at various depths; the type and total depth of the well, and total time to drill the hole.

Long experience in the oil fields has shown that this method of predicting the costs of a new operation is both practical and necessary. In the Gulf of Mexico, in less than 150 feet of water, offshore drilling and completion costs can double those for comparable onshore wells. And first-hole costs are considerably higher than for later wells where, once the subsurface terrain is known, better control and design are possible and drilling moves faster. Gulf's experience on the Louisiana offshore shows that the cost of a typical exploratory well, drilled from a jackup rig, can run in the region of \$1 million. Geology in the eastern Gulf is known to be different, and rank wildcats in this new territory could cost more.

With the drilling budget under study—and payment in full for the new leases on its way to the Department of Interior's Bureau of Land Management—the next move is out to sea. Each lease must be found. Beyond sight of shore in some cases, the ocean acreage must be surveyed and marked. Fathometer readings every five or six hundred feet over the entire lease will reveal the contours and depths of the sea

floor. Unusual or dramatic variations will be noted. These could upset budget predictions on the cost of drilling/production platforms that may eventually be needed.

Initially, once the lease is in hand, a blanket permit to place offshore structures is requested from the Army's Corps of Engineers (they have jurisdiction over U. S. navigable waters). Copies of the request—with precise geographic location of the tracts and drawings of proposed rigs, platforms, tenders, and anchor layouts—are sent to the Coast Guard, the State Wildlife and Fisheries Commission, and the Stream Control Commission. Traditionally, after a permit is granted, the operator notifies the Engineers of each new structure before it is placed.

In the eastern Gulf, the Department of the Interior has added new regulations which make for a more fastidious operation. Before drilling on any of these leases, the operator must hire a "recognized professional underwater archaeologist," who will investigate the site for cultural resources such as sunken galleons and other objects of archaeological or historical interest.

Because of the biological diversity of the Florida Middle Grounds (Apalachicola South Area, in which Gulf has an interest in three tracts), operators in this sector must file drilling plans which insure no damage to the biotic community. Drilling permits will have to be approved on a site-by-site basis. In addition to the operator's own study prior to filing, which will include inspection by "qualified biologist divers," the U. S. Geological Survey will make an independent study prior to approval.

In certain areas, where the coral community is concentrated, drilling rigs will not be permitted. Site selection must also avoid disturbing the seaweed carpet. Disposal of drilling muds and cuttings will be restricted in some areas; they will be barged elsewhere or deposited on the bottom with minimum disturbance. (A typical 10,000-foot offshore well will produce 695 tons of cuttings and 80 tons of mud components which must be disposed of.)

Pollution containment and cleanup equipment will also be placed on permanent standby, similar to that now based at Grand Isle, Venice, and Intracoastal City on the Louisiana shore. At these three bases Gulf and 38 other companies, organized as Clean Gulf Associates, maintain equipment that can reach an offshore oil spill 100 miles away within 12 hours. Two new bases

on the Florida coast will soon be stocked with similar equipment, which includes an open sea and bay skimmer, a shallow water skimming system (effective in as little as a foot of water), and an \$800,000 high-volume open sea system capable of working in seven-foot waves.

(It is worth noting that since the industry entered the Louisiana offshore in 1938, more than 14,000 holes have been drilled with only three major accidents. None were on Gulf wells. And in all three, pollution was of limited duration.)

In addition to keeping a weather eye on the general environment, the eco-systems, and the cultural resources in their immediate vicinities, operators in certain leases must also deal with the Defense Department. The movement of boats and light aircraft and the operations of shortwave radios must be coordinated not to conflict with operations out of Pensacola Naval Air Station or the Eglin, MacDill, and Tyndall Air Force Bases.

Operators are also informed that, depending on the element of danger anticipated from activities of the Armament Development and Test Center at Eglin AFB, they may receive an order to evacuate all personnel from all structures and to shut in and secure all wells within 48 hours. Operators and partners are further informed they must assume full risks for all damage and injury to property and personnel on their leases which might be caused by U. S. military activities in the Gulf. This could include such hazards as drilling into live ordnance buried in the mud.

With these and other items in mind, the operator may prepare to put a rig on location—if one is available. Drilling rigs and drilling equipment are scarce.

Among contributing factors: During the five years from 1967 to 1972, when no leases of any significance were offered in the Gulf, and exploration fell off sharply, the expensive rigs and their trained crews were diverted to foreign operations or the rigs were reluctantly mothballed. As drill pipe and other equipment wore out on rigs still working, they were often replaced by tools and pipe from idle rigs.

Now in the past year and a half, in response to the U. S. energy crisis, there have been four major Federal lease sales—in September and December 1972, and in June and December 1973—and another major deep-water offering will be made about the time this article is published. The



(IFC and page one) A close-up of a drilling crew at work on the rig floor. (above) A well being drilled from a semi-submersible platform offshore Louisiana. (right) The substructure of a semi-submersible being built in yards on the Mississippi River.





(above) Gulf's Alliance Refinery is on the Mississippi River, 25 miles below New Orleans. (left) Farther down the river is Ostrica Terminal with storage and facilities for loading crude oil tankers.

demand for rigs is becoming clamorous. The Bureau of Land Management estimates that in the eastern Gulf alone there should be 26 rigs operating by the end of this year, if the pace of exploration matches expectations. But a steel shortage is aggravating the situation, making drill pipe and tool joints scarce. Delivery time for drill pipe is six to eight months. For tool joints—threaded “pins” and “boxes” welded to the ends of drill pipe that screw into each other to connect up the drill string—delivery time is 18 months.

When a rig is available, contract surveyors put it on location. Unlike the busy Louisiana offshore, where distant platforms now make convenient survey control points, the waters of the eastern Gulf are unmarked. Setting a rig beyond the horizon, beyond reach of onshore line-of-sight triangulation, requires boats with electronic distance measuring gear. Miles out to sea they can drop a buoy within 25 feet of where the operator wants to drill the hole. Once the rig is on the buoy, a survey is made between known points, measuring distances and bearings to the rig, to verify its location.

Before the well is spudded in, the USGS must okay the location and entire drilling plan including the mud and casing programs. An important function of the heavy mud is to keep pressure on the formation as the drill goes down and to control the hole during sudden “kicks” of gas or salt water. In spite of considerable research, it is still not possible to predict with complete accuracy, for wildcat wells, the formation pressure that the wellbore will encounter. Steel casing ultimately packages the finished hole; it is set at prescribed depths on the way down. A layer of cement forced between the steel and the wall of the hole isolates the various formations and preserves the integrity of the well. Within this string of final casing is hung the tubing through which the well will be produced.

Several months may be required to drill and test a wildcat discovery. If tests are favorable, additional wells may be drilled nearby to confirm the presence (or absence) of sufficient oil to justify installing a permanent drilling/production platform. (Confirmation wells have been known to tell a sad tale on the heels of a promising discovery. In one of its foreign offshore searches, Gulf brought in a rank wildcat at 9,000 feet on a pinnacle reef which tested at 4,500 barrels per day—but adjacent wells were bone dry. The discovery was

plugged.) Confirmation or “stepout” wells help to define the limits of the reservoir. This is important. Because of the extreme expense of permanent deep-water platforms, it is necessary to drill from a single platform as many production wells as possible. The location of these platforms must be accurate to minimize the number required.

And so the mobile drilling rig moves off to seek new discoveries and the big permanent platforms move in.

Grounded in 200 feet of water, sturdy enough to withstand the pounding of stormy seas and hurricane winds up to 150 mph, a prefabricated steel platform with eight piles and 18 drilling slots, will cost \$2.5 million installed. A similar structure built to stand in 400 feet of water can cost up to \$7.5 million. Before such platforms come off the designer’s drawing board, it is necessary to core-drill 400 feet into the ocean floor to analyze the soil for piling sizes. An oceanographer calculates the force and height of waves which will occur during hurricanes at that location.

Ultimately the eight-pile foundation, or “jacket,” weighing in the region of 2,000 tons and constructed of hollow steel members, is floated out on a 300-foot long barge. At location it is slid off into the water. A derrick hooks into the top end while valves are opened at the bottoms of the legs to let the sea rush in. The slowly sinking jacket is tilted into a vertical position and guided till it stands firmly on the bottom. Pilings are driven down the hollow legs approximately 200 feet into the ocean floor. Then the deck section of 350 tons is barged out, lifted up, set on the jacket, and welded in place. From the fabrication yard at Morgan City to the final placement out at sea can take 25 to 30 days, if the weather holds. (The derrick barge cannot work if wave heights exceed eight feet.) Another 36 hours may be required to mount a drilling rig on the platform; then come the power plants; generators, living quarters, mess hall and storage sheds.

From this steel island miles offshore—with its fog horns and navigation lights, its automatic fire-fighting system and sensitive gas sniffers—the future production wells of the field will be brought in. The wells will be drilled by drifting the bit away from the vertical toward selected targets up to several thousand feet from the platform. When the drilling phase ends, and the rig is removed, the lower deck of the platform will

contain the Christmas trees of completed wells, and the producing equipment, the test separators, and the well manifold which will direct the oil and gas from the wells into a common line to shore.

Dotting the wilderness of the Louisiana offshore are upwards of 75 major platforms, of varying designs, installed by Gulf since 1955. As many as 56 men can live on one. The most remote, in Eugene Island Block 238, are 72 miles out. They are reached by helicopter and serviced by boats. All are equipped with an array of automatic safety and pollution control devices. These include sewage treatment by means of compressed-air activation and biological decomposition by aerobic bacteria, with settling and clarification followed by chlorine injection before the effluent is put into the ocean.

From this point on, the layout of an oil field—the options for gathering and treating and moving the oil and gas to shore—fall into two broad categories. Gathered at sea, the oil and associated gas and gas liquids can be separated offshore, and piped in separately—in which case suitable equipment must be mounted on platforms—or the separation can occur onshore. From storage onshore it moves by tanker or pipeline to a refinery.

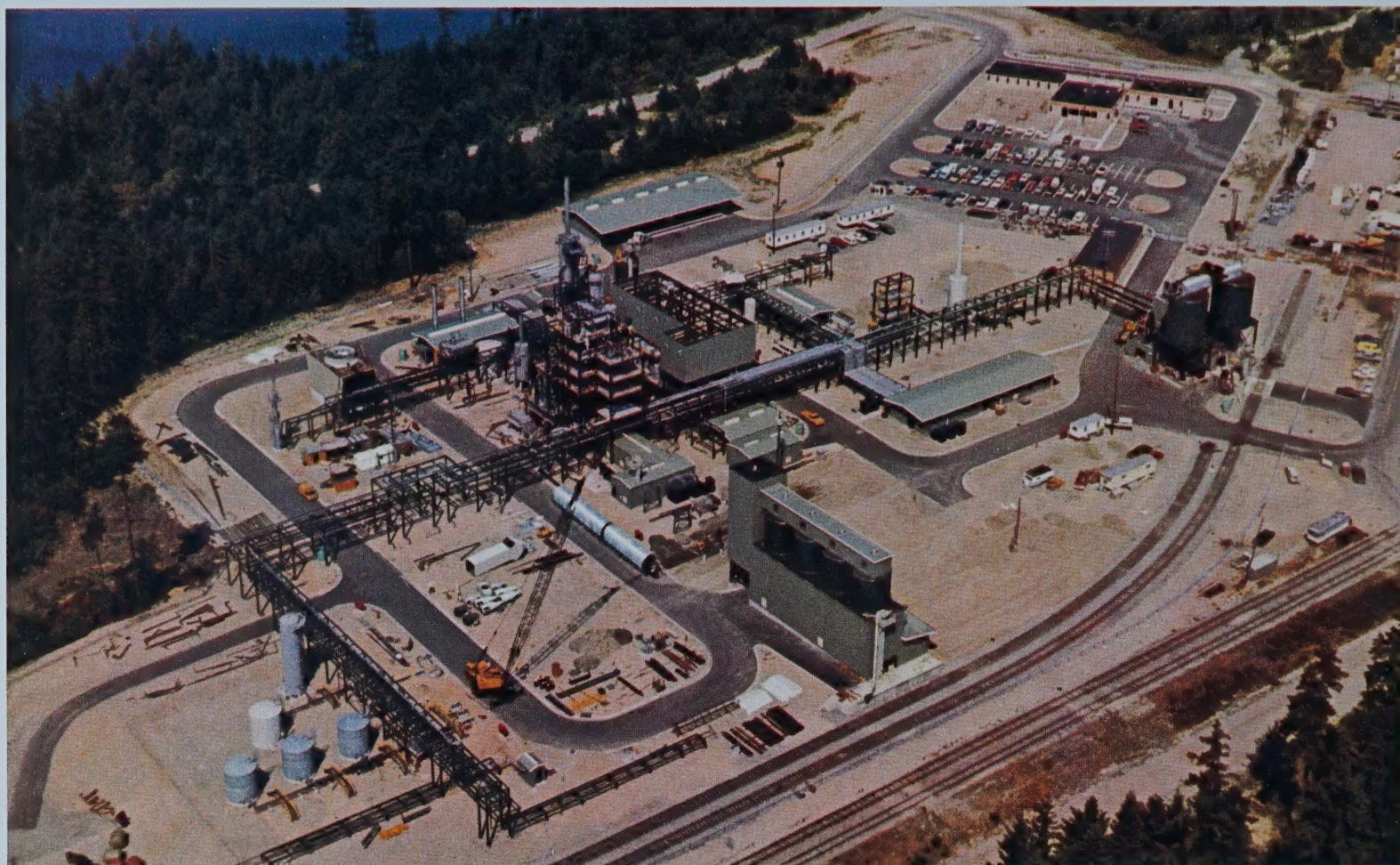
In Gulf’s operations in the Louisiana offshore, crude oil is pumped either to the Ostrica Terminal, and then conveyed by tanker to the Port Arthur Refinery in Texas; or it goes to the 160,000-bbl/day Alliance Refinery south of New Orleans. Natural gas and gas liquids (principally from West Delta Block 27) go to Gulf’s Venice Refinery southeast of New Orleans.

An example of the pace at which a major oil company and its affiliates can put a stretch of ocean wilderness on production is being demonstrated on the 12 offshore tracts Gulf and its partners acquired in the Federal lease sale of September 1972. On these tracts, to date, 33 wells have been drilled and 23 of them have been successful. Four platforms have been installed. Others are planned.

The tally for Gulf’s Louisiana offshore, first discovered in 1955, stands now at 17 fields with 618 producing wells—540 Federal oil and gas and 78 state oil and gas—for a total production of 90,000 barrels of crude oil and 975 million cubic feet of natural gas per day. Throughout Gulf’s territory off Louisiana, five rigs are now drilling.

Meanwhile, the curtain is about to rise on the wildcat country of the eastern Gulf.

SYNTHETIC FUELS: NONCONVENTIONAL ANSWER TO A CRISIS



Pittsburg & Midway Coal Company will operate the Solvent Refined Coal pilot plant near Tacoma, Washington, when it goes into operation by early fall.

"The enormous appetite for energy requires that we develop the whole spectrum of energy sources as expeditiously as possible. The competition of the future will be for fuels, fuels of all kinds, rather than between or among fuels."

These words, spoken by Gulf Executive Vice President E. B. Walker in an address before The Royal Society in London last November, might be considered the keynote for the next decade and beyond. Certainly, they sum up the challenge facing the industrialized nations and those companies in the business of supplying energy.

As the energy crisis continues, more and more attention focuses on sources other than petroleum, natural gas, and raw coal—the conventional fossil fuels. Undoubtedly, nuclear power will play a major role in the future. Solar energy, too, holds dramatic promise in long-range planning. Geothermal energy and the power obtained by harnessing the wind and the tides will make their limited contributions. In the decade just ahead, however, synthetic fuels promise to be one of the most rapidly developing and important new sources of energy.

The term "synthetic fuels" invites all kinds of questions because the general public finds it confusing. What are synthetic fuels? Where do they come from? Why haven't we had them before? What role will they come to play? There are many questions and the answers are complex.

In the first place, "synthetic fuels" is a misnomer. Mr. Walker, in his speech, used the term "nonconventional hydrocarbons" to describe synthetic fuels. His term is more accurate. The fuels are nonconventional in that they are fossil materials that have been converted from the state in which they occur in nature. Even so, synthetic fuels remains the popular term throughout the industry.

Predictions are that synthetic fuels will begin to be of importance to the United States by the 1980s, and consequently will also be of importance to the world. As Mr. Walker said, "By reducing our requirements for imports, pressure on conventional world oil supplies will be lessened. In this sense, the development of a synthetic fuels industry in North America is of great importance to the rest of the world."

Synthetic fuels come from three sources

in nature: tar sands, oil shale, and coal. From these raw materials can be produced a whole range of fuels from gases to heavy furnace oils and solids. Gulf is involved, either on its own or in partnership with others, in major research and business planning in the production of synthetic fuels from all three source materials.

Tar sands should be considered first because there is already a commercial plant in operation in Canada making synthetic crude oil from tar. (All of the other synthetic fuels processes are still in various stages of development.) Tar sands are simply very old oil deposits from which the light hydrocarbons have escaped, leaving the heavy, asphaltic residue behind. The technology for treating tar sands to make synthetic crude oil is relatively simple although more research on improved methods is needed; the major problem is one of mining. In round numbers, it takes about two tons of tar sands to produce one barrel of syncrude. (Syncrude is the name given to top quality synthetic crude oil made by refining crude tar.)

The largest known tar sands deposit in the world, and the only one that will be of

commercial importance in the next decade, is in the Athabasca region of Alberta in western Canada. Estimates of reserves there range from more than 6 billion barrels of easily recoverable, high-grade material, to about 300 billion barrels in total potential. Much of the tar sand can be surface mined; however, techniques for in-situ recovery will have to be perfected to extract deep-lying deposits.

The commercial plant mentioned earlier is now producing 50,000 barrels of synthetic crude a day by strip mining the sand and extracting the oil with a hot water process. The facility is to be enlarged.

Syncrude Canada Ltd., a consortium of companies in which Gulf participates, will build a plant in the region. The facility, which will cost in excess of \$900 million, will have an initial design capacity of 108,000 barrels a day and is to be in operation by 1978. Estimates are that by 1985, maximum production of synthetic crude from the Athabasca tar sands will be about 1,250,000 barrels daily.

Oil shale, the second source material for producing synthetic fuels, is found in great deposits in the Rocky Mountain region of the western United States. Projections on reserves run into the trillions of barrels. The National Petroleum Council, however, has estimated that commercially desirable reserves, favorably located, are about 34 billion barrels, based on a yield of 35 gallons or more of synthetic crude oil per ton of shale.

One of the most interesting facts about oil shale is that it is neither a shale nor does it contain oil. Instead, it is a marlstone that contains, tightly bonded to it, a bituminous material called kerogen. When the shale is heated, the kerogen is broken down to "shale oil." Geologists are not all in agreement as to its origin, but a popular theory is that kerogen is "young" petroleum, a substance that would eventually evolve into crude oil at some time in the distant future.

Although the processing of oil shale is considerably more complex than the processing of tar sands, the technology for mining and retorting the shale does exist. The U. S. Bureau of Mines has worked with a number of private companies to develop retorting processes (i.e., processes in which the material is decomposed by heat in an oxygen-starved atmosphere).

The Oil Shale Company (TOSCO) has completed operations on a semi-works plant, handling as much as 1,000 tons of shale a day. In the TOSCO process, the shale is pulverized and fed into a horizontal kiln where it is crushed by ceramic balls that have been heated to very high temperatures. Direct contact with the hot ceramic balls heats the shale to retorting conditions.

A critical problem in oil shale processing is waste disposal. In the TOSCO process, the shale, ground to a talcum-like con-

sistency, expands in volume by at least 10 percent so that it simply cannot fit back into the hole from which it was taken. Waste disposal areas must be created. Progress is being made in experiments to treat the waste so that it will support vegetation.

As an alternative to the TOSCO process, Gulf is participating with 17 other companies in the Paraho project, which is attempting to develop a vertical kiln process (of a type used in limestone production) that promises to substantially reduce investment and costs. Since the process uses a coarser charge of shale, the waste disposal problem should not be as complex. An existing government oil shale facility at Anvil Points, Colorado, has been made available by the Department of the Interior and a Paraho kiln is being installed there for the tests. "Paraho," incidentally, is a Portuguese word that means "for the good of mankind."

Involvement in the Paraho project takes on new significance for Gulf in view of developments on January 8, 1974. That was the date on which Gulf, in partnership with Standard Oil Company (Indiana) submitted the highest bid for a lease on Tract C-a, more than 5,000 acres in Rio Blanco County, Colorado, with a bid of \$210 million. This was the first of six tracts to be auctioned by the Department of the Interior as part of its prototype oil shale leasing program. Rather than have a massive move to develop the oil shale lands, the Government has picked the six tracts, each with different mining conditions, as part of its

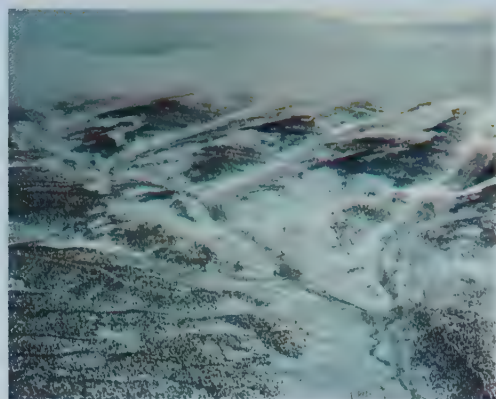


Tar sands are now being mined commercially in the Athabasca region of Alberta, western Canada.

demonstration program to make certain that environmental concerns can be worked out satisfactorily.

F. D. Dreizler, Vice President, Synthetic Fuels, Gulf Minerals and Energy Company (GEM), in commenting on the Colorado lease, said, "Eventually, we should have a good-sized mine, a retorting operation, and

a hydrogenation plant—a refining-type facility to produce syncrude. The plant will have an initial capacity of 50,000 to



Snow covers Colorado's Rio Blanco Country where Gulf and partner have the Tract C-a oil shale lease.

100,000 barrels a day, and will cost approximately half a billion dollars." He added, "My guess is that it will be 1980, at the earliest, before the facility can be in operation."

The remaining raw material used for the production of synthetic fuels is coal. Most people think of coal in itself as a fuel so that the idea of processing it into a synthetic fuel may seem unnecessary. Coal, however, has some distinct disadvantages which have limited its use.

What we call coal ranges in quality (meaning, essentially its heat content which is measured in British Thermal Units or BTUs) from lignite or "brown coal" through sub-bituminous to bituminous or "soft coal" to anthracite, or "hard coal." A solid, coal is more difficult and expensive to handle than a liquid or gas. It has a high ash content, which adds to transportation, disposal, and environmental problems. More important, from an environmental standpoint, is that much coal of commercial significance has high sulfur content and burning it presents serious air pollution problems.

Despite these drawbacks, the tremendous reserves of coal in the United States (estimates run as high as three trillion tons) make it a primary energy source. An obvious solution to the disadvantages that coal offers is to refine it to remove as much of the sulfur and ash as possible—i.e., convert it to a synthetic fuel.

Research and development in coal conversion is progressing rapidly through joint efforts by private industry and the Federal Government. Several commercial-size coal gasification plants have been announced based on the Lurgi process, which was developed in 1936. In the process, a low BTU "synthesis gas" is formed by heating coal with steam and oxygen. The gas may be

either burned at or near the site or made into a high BTU gas of pipeline quality by upgrading it in a methanation process. (Almost all synthetic fuels have a higher hydrogen content than the original raw material. In this case, the hydrogen comes from the steam.)

Gulf is participating with a number of companies and the British Gas Corporation in a methanation demonstration program in Westfield, Scotland. The program, which is about 75 percent complete, has already achieved a degree of success. The process, essentially, converts the synthesis gas into methane, which is the principal ingredient of natural gas. Since the U. S. has a very large natural gas pipeline system, the methanation program is important to the ongoing development work in synthetic fuels.

Because nearly all of the technology is in hand, coal gasification is likely to be the leader in the development of a U. S. synthetics industry. Several other major demonstration projects are underway and others are planned. Gulf is considering a number of proposals. The NPC estimates that by 1985, synthetic gas production from coal will range from one-half to 2.5 trillion cubic feet per year.



Gulf participates in a methanation research program underway at this plant in Westfield, Scotland.

Another highly promising coal conversion project well underway is the Solvent Refined Coal process (SRC) aimed at providing clean, high-energy fuel compatible with environmental concerns. The process was developed by The Pittsburg & Midway Coal Mining Company, a Gulf subsidiary, under the sponsorship of the Office of Coal Research of the U. S. Department of the Interior. Initial work was begun by P&M in 1962. In 1972, ground was broken for a 50-ton-per-day pilot plant near Tacoma, Washington. The plant, of which Pittsburg & Midway is the operator, should be in full operation by early fall. Gulf is proposing to the Office of Coal Research that a 5,000 ton-a-day demonstration-size plant be built, one that could be expanded into a full-scale

(20,000 to 30,000 tons per day) commercial facility.

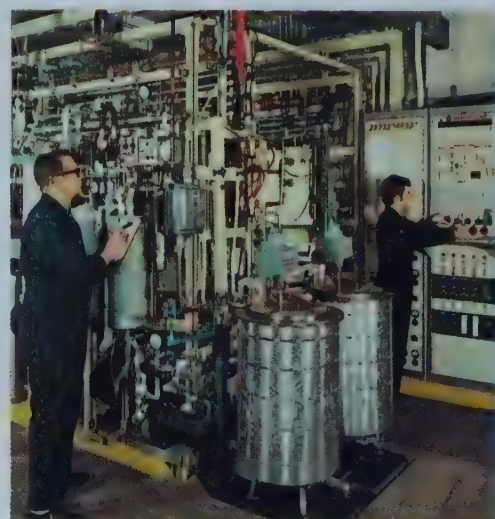
In the SRC process, high ash, high sulfur, high water content coal, ranging anywhere from 6,000 to 12,000 BTUs per pound in heat value, is pulverized, dissolved in a coal-based solvent, and heated under pressure in the presence of hydrogen. What emerges is a low ash (less than .1 percent), low sulfur (less than 1 percent) product with moisture completely eliminated and its heat content upgraded to at least 16,000 BTUs. The SRC may be kept a liquid under elevated temperatures or cooled and formed into prills—B-B-like pellets—for shipment.

In coal liquefaction, Gulf has proprietary interest in a Catalytic Coal Liquids process (CCL) that has been under development at the Gulf Research & Development laboratories in Harnarville, Pa., for the past six years. Using technology acquired in perfecting the Gulf hydrodesulfurization process (now used in a number of refineries to reduce the sulfur content of heavy fuel oils), the Gulf Research Center has come up with a process for liquefying coal. The pulverized coal is dissolved in a coal-based solvent, hydrogen is added in the presence of a catalyst, and the resulting product is a low ash, low sulfur, easily pumpable liquid.

Work on a laboratory scale has satisfied researchers that CCL is an acceptable substitute for No. 6 fuel oil and, in some respects, even for No. 4 fuel oil for power plants and other large users. GR&DC is now designing and constructing a one-ton-a-day pilot plant at Harnarville, and engineering studies have begun on larger units.

This article attempts to give a sweeping overview, vastly simplified, of this highly complex, yet rapidly growing phase of the energy field. The syncrude tar sands plant and one or two coal gasification plants will be running in the late 1970s, barring any further delays. Unless there are startling technological breakthroughs (a possibility that cannot be ruled out), it appears that it will be 1980 before any appreciable large-scale commercial production of synthetic fuels from shale oil or coal liquefaction will begin. That means that it will probably be the mid-1980s before synthetic fuels begin to have a real influence on the total energy picture. The NPC has estimated that by 1985 total production of synthetic fuels in the United States will reach 2.5 million barrels a day. There are others who feel that estimate conservative and predict that much faster progress, and to a higher level, will be made.

Even with the dedicated efforts of the oil industry, the task of making synthetic fuels a reality by the 1980s will require herculean efforts from many other elements of American industry. The fabricators, for example, will be hard pressed to assemble the quantities of massive plant and equip-



GR&DC's laboratory-scale Catalytic Coal Liquids unit is being replaced by a ton-a-day pilot plant.

ment that will be needed for both mining and above-ground processing. The coal industry will have to be doubled in output, and then perhaps doubled again. One 100,000 barrel-a-day coal liquids plant will require an input of more than 30,000 tons of coal a day. To put that in perspective, 30,000 tons a day is about the total current output of Pittsburg & Midway Coal Mining Company (13th largest coal company in the nation). Finding enough people with the skills or who can be trained to man the equipment could be a problem.

Something that has not been emphasized in this write-up is the tremendous financial investment that will be required. Because the size and scope of most synthetic fuels operations are so massive, the amounts of money involved are "massive" too. As mentioned earlier, one 100,000 barrel-a-day oil shale facility of the type Gulf is now involved with in Colorado will cost an estimated half billion dollars. And this is not an exception. The price tag for achieving energy self-sufficiency in the United States has been estimated at about \$500 billion.

Man has long been aware of the potentialities of synthetic fuels. He has worked casually at perfecting the techniques for extracting and forming them because there was no urgent demand. Economically, they had been unable to compete with natural gas and crude oil. All that has changed.

As Mr. Walker said, at the conclusion of his talk quoted earlier, "It seems clear that from now to 1985 there will be much capital invested in synthetic fuel development. . . . The technology and the capability are partly here and partly in the development stage, and the comparative economics are becoming ever more attractive.

"And, most importantly, the time has come."

GULF OIL CORPORATION 1973 ANNUAL REPORT



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Registrars

Bankers Trust Company, New York
The First National Bank of Chicago
Pittsburgh National Bank
Montreal Trust Company, Toronto

Transfer Agents

Bankers Trust Company, New York
The First National Bank of Chicago
Mellon Bank, N.A., Pittsburgh
Canada Permanent Trust
Company, Toronto

Highlights

	Millions of Dollars	
	1973	1972
FINANCIAL		
Income Before Extraordinary Item	\$ 800	\$ 447
Net Income	800	197
Capital Expenditures (including business investments)	823	718
Exploration and Dry Hole Expense	156	141
Total Revenues	10,007	7,733
Long-Term Debt	1,608	1,941
Shareholders' Equity	5,569	5,409
Employed Capital	7,670	7,832
Per Share Data		
Income Before Extraordinary Item	\$ 4.06	\$ 2.15
Net Income	4.06	.95
Cash Dividends	1.50	1.50
Shareholders' Equity	28.61	26.04
OPERATING		
Net Crude Oil and Condensate Produced (daily average barrels):		
United States	439,700	476,600
Foreign	2,572,400*	2,609,100
Total	3,012,100	3,085,700
Net Natural Gas Liquids Produced (daily average barrels)	128,200	128,000
Net Natural Gas Produced (thousand cubic feet per day)	3,360,400	3,572,100
Crude Oil Processed (daily average barrels)	1,976,100	1,945,000
Refined Products Sold (daily average barrels)	1,781,400	1,676,700
Coal Mined (daily average tons)	22,100	21,000
Chemicals Sold (daily average tons)	16,700	15,600

* Includes an average of 582,700 barrels daily purchased under Participation Arrangements beginning in 1973.

To the Shareholders of Gulf Oil Corporation

Consolidated net income of Gulf Oil Corporation for the 12 months that ended December 31, 1973, was \$800 million, or \$4.06 per share based on the weighted average shares outstanding during the year.

When compared with 1972 earnings of \$447 million before an extraordinary write-off of \$250 million, this is an improvement of 79 percent or \$1.91 per share, and represents a profit of 8.0 cents per dollar on gross revenues of \$10.0 billion, up from 5.8 cents on \$7.7 billion in 1972.

The 1973 earnings represent a return of 11.7 percent on employed capital, up from 6.8 percent in 1972. The earnings also represent a compound annual increase of five percent since the highest prior year, 1968, when earnings were \$626 million.

So 1973 was a turnaround year for Gulf. Some reasons for the higher earnings were improved refined product prices in Europe and Canada; higher refined product sales volumes; increased sales of plastics and chemicals; elimination of marginal operations; and an expanded tanker fleet and improved tanker charter position. In the U. S., due to demand out-running supply, wholesale prices of gasoline to dealers moved up to the price ceilings set by federal price control. All other price increases were limited to increased costs passed through as permitted by federal price control regulations.

In February, 1974, Gulf filed a lawsuit challenging the validity of regulations issued by the Federal Energy Office controlling the mandatory allocation of crude oil and petroleum products. Gulf is being compelled to sell its own crude oil to other refiners that cannot meet the national industry ratio determined by the Government to be 76 percent of capac-

ity. Gulf has made substantial investments to obtain crude oil and construct and modernize its refineries, and can operate its U.S. refineries at 91 percent, or more, of capacity. This mandatory allocation, which reduces Gulf to 76 percent, amounts to the unwarranted taking of private property, requires Gulf to sell crude oil to its major competitors, and is not in the public interest. The allocation of crude oil to refiners on this arbitrary basis will probably lead to less total product yield from the same volume of crude oil. In effect, the nation will have less gasoline, heating oil, petrochemical feedstocks and other petroleum products, probably at higher prices.

Gulf has targeted more than \$860 million for energy resource acquisition and development in North America in 1974. Gulf, in December, purchased offshore oil and gas leases in the Gulf of Mexico for almost \$175 million and, in January, 1974, successfully bid \$105 million for a half interest in a 5,000-acre oil shale tract in Colorado.

International events have caused uncertainty about the ability of an international oil company to perform its traditional functions. The outbreak of hostilities between the Arab States and Israel in October resulted in the Organization of Arab Petroleum Exporting Countries (OAPEC) imposing oil embargoes on certain countries which openly supported Israel's war effort and a general production cutback of supplies to other nations. The production cutback began in late October and amounted to approximately 375,000 barrels of crude oil per day for Gulf in Kuwait during November and December, or a 25 percent reduction from pre-embargo supplies.

The Arabian Gulf members of the Organization of Petroleum Exporting Countries (OPEC) unilaterally increased posted prices of crude oil on October 16, 1973, and again on January 1, 1974. These actions resulted in a posted price that is now 465 percent of what it was

a year ago, adding more than \$5.50 per barrel to Gulf's cost of crude oil from Iran and Kuwait. These actions have resulted in even larger increases in other countries where more valuable low-sulfur crude oil is produced.

On January 29, 1974, the Government of Kuwait signed a new Agreement on Participation with Gulf and British Petroleum Company. It has been submitted to the Kuwait National Assembly for ratification and replaces the old Agreement on Participation which had been developed and signed by the main Arab producing states in the Gulf, but which had not been ratified by the Kuwait National Assembly.

The new agreement provides for the Government of Kuwait to purchase a 60 percent interest in all assets and operations of the companies in Kuwait as of January 1, 1974. In addition to retaining a 40 percent share of the production, Gulf and British Petroleum will have the right to purchase available quantities of the Government's equity oil at commercial prices. The relationship between the Government and the companies will be reviewed prior to the end of 1979.

All of these developments have made it difficult to predict availability and cost of crude oil. Further complicating the outlook is the uncertainty about what action the U. S. Congress will take. Gulf believes the energy problems of this nation can be solved but it will take the cooperation of the public, government, and the energy companies with the recognition that large amounts of capital must be generated to carry forward a successful energy program. And energy companies must be allowed to help generate the enormous capital it will take.

With improved earnings, Gulf's financial position was further strengthened in 1973 as long-term debt was reduced \$333 million, or \$193 million more than scheduled maturities, and 13 million Gulf shares were acquired for general corporate purposes including possible

future acquisitions.

The properties involved in the \$250 million extraordinary write-off in 1972 have been disposed of with the exception of the refinery and certain marketing facilities on the U. S. West Coast which we have decided to retain.

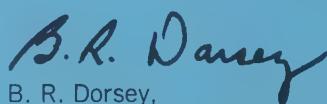
An equal partnership was formed by Gulf and the Royal Dutch/Shell Group of Companies to own and operate the nuclear business previously carried on by Gulf Energy & Environmental Systems.

The Fort St. Vrain nuclear power station near Denver, Colorado, has been successfully fueled and start-up plans are proceeding smoothly. The plant should be at full commercial power in 1974 and will become, we feel, the basis for future sales to other power companies.

The returns Gulf has earned and the increasing seriousness of the energy shortage have resulted in a 1974 capital budget of almost \$2 billion, more than double the 1973 earnings and almost double the average of spending plans over the last five years. Of this, \$1.5 billion is allocated for projects to develop new supplies of energy.

We are optimistic that the record capital budget will strengthen Gulf's position as a total energy company and that 1974 will be a good year for Gulf.

Respectfully submitted,



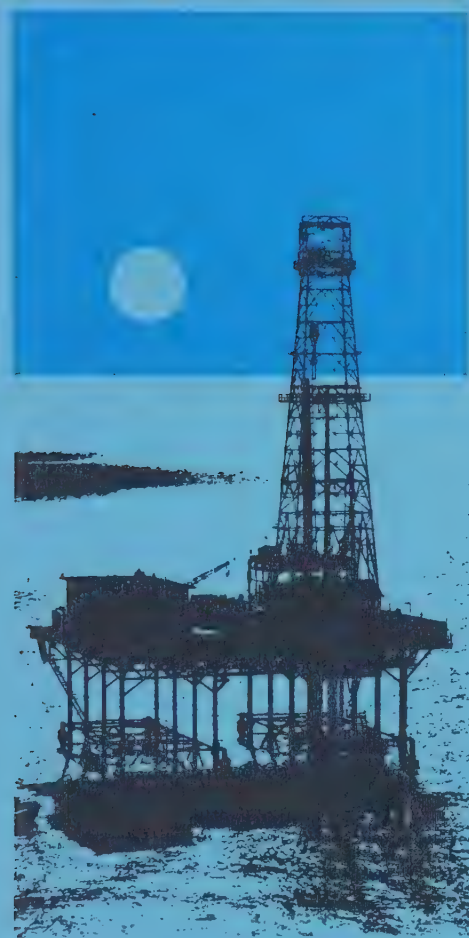
B. R. Dorsey,
Chairman of the Board



James E. Lee,
President

March 18, 1974

Petroleum Exploration and Production



During the year Gulf had a decrease in the production of crude oil, condensate and natural gas liquids of 2.3 percent, from 3,213,700 barrels per day in 1972 to 3,140,300 barrels per day in 1973.

The sales of natural gas decreased from 3.576 billion cubic feet per day to 3.346 billion cubic feet per day, a 6.4 percent decrease although sales revenue slightly exceeded the record 1972 level.

The sales volume of natural gas liquids remained constant with 1972; however, improved prices caused a 22.1 percent increase in revenue.

United States: Crude oil, condensate, natural gas liquids, and natural gas production continued to decline in the U.S. during 1973. To offset this decline, efforts to find more oil and gas have intensified.

As a result of the continuing development program in the Uinta Basin of northeastern Utah, Gulf now operates 32 wells, and is marketing approximately 14,000 barrels of high-wax crude oil per day from these wells.

Three major discoveries have been

made in the 12 blocks Gulf acquired in the September 1972 federal offshore sale in Louisiana. Of 33 wells drilled, 23 have been successful. Four platforms have been installed and others are being planned. Oil production is expected to begin by the second quarter of 1975.

At the federal sale in December for leases offshore Louisiana, Mississippi, Alabama, and Florida, Gulf and partners were successful in acquiring 18 of the 26 tracts on which bids were submitted. The net cost to Gulf was \$174.4 million. Three tracts are drainage blocks near proven oil production while the others are in a new and untested area. Plans to test these blocks with wildcat wells are underway.

Gulf's drilling activities continue to be successful in the deep gas play of the Delaware Basin in West Texas and in the Morrow Trend of New Mexico. An important oil discovery was made in Crane County, Texas, during 1973, and further development is being pursued.

Gulf is continuing efforts to retain the production on the West Texas leases which expire in mid-1975. Progress has been encouraging, as portions of these leases have been extended.

While production has continued from Federal leases in the Santa Barbara Channel off California, it is hoped that the drilling ban will soon be lifted so that attractive acreage under lease might be further evaluated.

Gulf wrote off the unamortized costs of six leases in the Colville Delta area of Alaska and abandoned four of them. Interests in the remaining two leases along with lease interests in other areas of Alaska were retained.

Gulf Global Exploration Company has been established to coordinate and be financially responsible for all exploration activities in frontier areas.

The *Hollis Hedberg*, the most modern research and exploration ship in Gulf's fleet, will be operational in 1974. Designed for Arctic waters, the ship will allow Gulf to gather geophysical data in all the undeveloped areas of the world.

Canada: Net volumes of crude oil and natural gas liquids produced by Gulf Canada in 1973 increased 10 percent over 1972. While sales volumes of natural gas declined 2.4 percent, prices were increased significantly during the year which increased revenues over 1972.

Gulf Canada's 1972 gas condensate discovery at Parsons Lake in the Macken-

zie Delta was followed up with a stepout well which established five gas zones with flow rates between three and 37 million cubic feet daily. Gulf Canada has now participated in 14 Mackenzie Delta wells, five of which have been gas discoveries, for a discovery ratio of over 35 percent. Four wells were drilling at year end.

Canadian Arctic Gas Study Limited, of which Gulf Canada is a member, is expected to make application early in 1974 to build a pipeline to carry natural gas from Prudhoe Bay, Alaska, and Northern Canada to markets in the United States and Eastern Canada.

The Company participated in 41 wildcat tests in Alberta. There were 11 gas discoveries and one oil discovery. Most of this program was supported through an exploration agreement with Pan Ocean Oil Corporation.

Under a joint venture agreement, two wells were drilled on the Grand Banks and, although both were abandoned, the test results in one of the wells were encouraging. Two wells were drilled on the Labrador Shelf, one of which was completed after encountering hydrocarbon shows; further evaluation will continue in 1974.

Latin America: In Venezuela, Gulf's share of net production of crude oil, condensate and natural gas liquids averaged 170,500 barrels per day, a six percent increase from the 1972 level. A portion of the South Aragua gas gathering project in Eastern Venezuela was placed in service, permitting the sale of an additional 30 million (Gulf's share) cubic feet of natural gas per day to CVP, the national oil company. A new exploitation tax agreement for crude and LPG was negotiated and a three-year labor contract was completed during 1973.

In Ecuador, Gulf's 50 percent share of net production of crude and condensate, which averaged 86,600 barrels per day in 1973, is expected to increase to 105,000 barrels per day in early 1974 following completion of repairs from fire damage to one of the pipeline pump stations. A 20-year contract with the Government of Ecuador was signed on August 6, 1973. Consideration is being given to an expansion of the pipeline capacity from the present 250,000 barrels per day to 400,000 barrels per day. (Gulf's share is 50 percent of those amounts.) Gulf and its partner have begun discussions regarding acquisition

by the Ecuadorian Government of a 25 percent participation interest.

Tax reference prices were increased dramatically during the year by the Venezuelan and Ecuadorian Governments.

Colombian production facilities were disposed of effective September 1, 1973, as part of the 1972 divestment.

Increased prices applicable to Bolivian oil and gas sales and increased gas volumes are expected to accelerate Gulf's receipt of the indemnity resulting from nationalization of its properties there in 1969.

Middle East: During the first nine months of 1973 production in Kuwait continued at an average of 3,000,000 barrels per day, which includes Gulf and its partner's share in the Kuwait Oil Company as well as the Government's share of crude from royalties and participation. In October, deterioration in the Middle East political situation resulted in reduced production and embargoes on shipments to certain countries. As a result, the Corporation's share of production during the year was 1,039,500 barrels per day, and in addition Gulf purchased 346,500 barrels per day of government participation crude.

In Iran, Gulf's crude oil entitlement increased about 12 percent to 307,000 barrels per day. A new agreement covering the management of the Consortium area was reached with the Government and oil operations there were not adversely affected by the Middle East political problems.

Africa: Nigerian production rates increased once again in 1973 and average crude oil production for the year reached 364,600 barrels per day, a 12 percent increase over 1972. Exploratory operations during the year resulted in three new field discoveries in Western Nigeria, one offshore and two onshore. Appraisal and development of these discoveries have begun and should be completed in 1974. Negotiations with the Nigerian Government on acquisition of a substantial participation interest are underway.

Exploratory and development drilling offshore Cabinda continued with some success, resulting in extensions to existing fields and confirmations of previous discoveries. Crude oil production increased to about 144,000 barrels per day, a 13 percent increase over 1972. Four wells have been completed as producers at tested rates of up to 8,000

barrels per day and will ultimately be put on stream. Although the individual wells are excellent, they do not represent a major new discovery, but are more important extensions of existing fields.

In Zaire, a new field was discovered close to the discovery made in 1971. Appraisal drilling in both fields continues and it is planned that production will begin from these offshore wells in 1975 at an anticipated initial rate of 25,000 barrels per day of which Gulf's share is 50 percent.

Appraisal drilling in Gabon continued and one field in which Gulf has a 30 percent interest is expected to begin production late in 1974. Exploratory drilling and evaluation of the commercial potential of other discoveries on Gulf's 100 percent acreage are continuing.

An onshore concession in Tunisia was obtained with a partner. Exploration will begin early in 1974.

Europe: Gulf was involved in three significant discoveries in the United Kingdom sector of the North Sea in 1973. Gulf and partners will join with other operators in unitizing the discoveries made in structures which comprise the Thistle, Dunlin, and Hutton fields, all of which are northeast of the Shetland Islands.

Exploratory drilling also was carried out in the Danish and Dutch portions of the North Sea. Drilling by the Danish Underground Consortium continued in the Danish offshore area. Production from the Dan field, offshore Denmark, has been disappointing. Additional development drilling is scheduled in order to improve production rates.

Exploratory drilling began in mainland Italy and one well in the Mediterranean Sea off southern Sicily drilled by Gulf and partners was dry. A portion of the acreage in Italy was relinquished after evaluation to allow concentration of activities in more promising areas.

Asia: Exploratory drilling was conducted in Indonesia, Korea, Thailand, and Taiwan and further exploration activities in most of these countries will continue throughout 1974. Under a joint venture agreement, Gulf and Teikoku Oil Co., Ltd. of Japan obtained exploratory rights to portions of the Japanese offshore continental shelf. Seismic and drilling operations are expected to commence in this area in 1974. Gulf has also been participating with the Japanese in negotiations

concerning joint Japanese-Soviet development of Siberian oil resources.

Transportation

By the end of 1973 Gulf's fleet of oil tankers consisted of 92 owned and long-term chartered vessels with a total capacity of 9,200,000 deadweight tons. This places Gulf in a well balanced ocean fleet position with exposure to the fluctuations of spot and short-term charter costs at a minimum.

Despite the Arab oil embargo, prospects for our fleet operation in 1974 are excellent.

As a result of major construction and charter programs begun in 1969, Gulf added four new supertankers in 1973 having a combined cargo capacity of 1.1 million deadweight tons. The Gulf supertanker fleet of vessels over 160 thousand deadweight tons accounted for 64 percent, or 5,900,000 deadweight tons, of our total ocean-going fleet, providing Gulf with one of the most modern fleets in the industry.

The scheduled delivery of five new tankers in 1974 for use mainly in the Western Hemisphere should enable Gulf to maintain a balanced fleet operation and realize further economies of operation.

Refining



United States: Reacting to the nation's increasing energy shortage problems, Gulf's refineries achieved record processing levels.

The Alliance Refinery, south of New Orleans, which went on stream in 1972, has been operating above its initial design capacity throughout the year. It is one of the newest major refineries in the nation.

A decision was made to retain the refinery at Hercules, California, which had been scheduled for sale as part of the 1972 divestment program.

Foreign crude oil was introduced for the first time in significant quantities into the Port Arthur Refinery. The Philadelphia Refinery operated on essentially all foreign crude. As practically all of this foreign crude oil was from West Africa and South America, with the Toledo Refinery being supplied in part from Canada, there was no direct effect on Gulf's U.S. refinery runs due to the Arab oil embargo on shipments to the U.S.

Energy conservation programs were intensified to conserve fuel through both new procedures and the installation of new equipment at all refineries.

Octane ratings also were lowered to increase the quantity of gallons of gasoline produced.

Several major air and water anti-pollution projects were completed and others instituted in line with continuing efforts to meet new regulations.

International: Gulf Canada's refineries processed 10 percent more crude oil than in 1972. At year end all refineries were operating at maximum capacity.

In Asia, the Okinawa Refinery, in which Gulf has a 45 percent interest, experienced its first full year of operation. Gulf's 50-percent owned Okinawa Terminal, one of the world's largest crude oil storage facilities, continued to serve the refinery and other Japanese customers.

The refinery in Bilbao, Spain, which began operating in 1972 and in which Gulf owns a 40 percent interest, is processing an average of 120,000 barrels per day for the government-controlled Spanish market and for export.

Gulf sold its minority interest in Rio Gulf de Petroleos, S.A., which operates a refinery at Huelva in southern Spain, and, as part of the 1972 divestment program, sold its wholly owned refinery at Emden in Germany.

Marketing

United States: Rapidly rising demand coupled with refined product shortages

set the pace for marketing in the U. S. Prices for refined products were improved over the depressed prices of 1972. Further price increases were limited by the Cost of Living Council to cover only certain cost increases.

Gulftane Low-Lead, which met most new car specifications, was discontinued at year's end to permit production and sale of Gulfcrest, a new, no-lead product. It was introduced to meet federal requirements that by July all stations selling 200,000 gallons or more per year must provide one no-lead product.

Gulf's divestment program to eliminate marginal or unprofitable service stations, announced in 1972, was completed by year end.

Plans are to concentrate all available petroleum products where needed according to government guidelines and to expand into or develop marketing areas in which Gulf's operations are most profitable.

There were more than 1,590 Holiday Inns at year's end in the U. S., Canada, Puerto Rico and the Bahamas operating under the unique Gulf-Holiday Inn alliance.

International: Gulf Canada's sales of petroleum products increased by nine percent over 1972. An unleaded gasoline, "Futura," was introduced into the market in late summer.

The self-service concept continued to receive strong consumer acceptance and further expansion will continue in 1974.

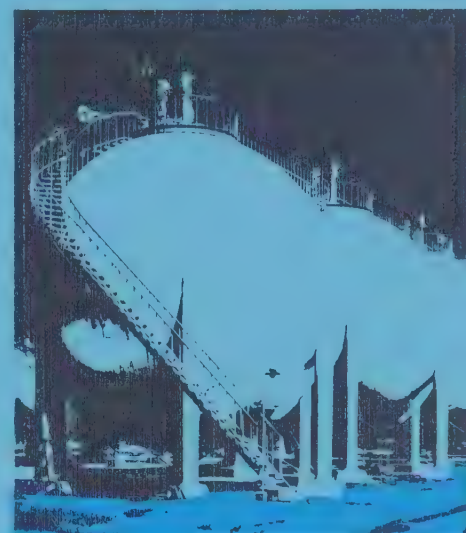
The investment climate for the marketing of petroleum products in Latin America marketing was affected adversely by governmental controls. In Venezuela, legislation makes it mandatory for the national oil company to take over the marketing of all petroleum products during the next four years. Gulf's marketing assets were taken over in January, 1974. The marketing operation in Costa Rica was sold and sales of unprofitable marketing assets in Ecuador, Guatemala and Panama are being negotiated.

In Europe, Gulf continued its long-range plan to concentrate retail volumes in fewer and larger outlets. Some 300 small outlets were closed. One hundred sites were upgraded and converted to self-service operation. About 60 diversified self-service outlets were built, including Car Care Centres and Tunnel Wash Gas Bars.

Marketing operations in Germany,

which were included in the 1972 divestment program, and in Finland were discontinued with the sale of Gulf's assets in these countries.

Chemicals



Gulf Oil Chemicals Company sales and earnings set new records in 1973. Manufacturing was at capacity, as sales volumes of major petrochemicals and other products such as adhesives, explosives, plastics and crop protection products reached new highs. Return on investment was further improved by discontinuance of several unprofitable and marginally profitable businesses.

United States: Construction was started on a plant at Cedar Bayou, Texas, to produce 1.2 billion pounds per year of ethylene and large volumes of other olefins and aromatics. To be completed in 1976, this plant will have the flexibility to use either naphtha or gas oil feedstocks which should provide a more secure supply. New capacity for high-density polyethylene was added during the year at the Orange, Texas, plant and work has begun on a large scale addition to the low-density polyethylene facilities at Cedar Bayou.

World demand for wheat resulted in record shipments of our proprietary herbicide for use on this crop.

Despite serious industry-wide shortages of aromatic feedstocks, Gulf's total integration from crude oil to chemical products permitted aromatics operations at high levels of production with only a minor effect on availability to large customers.

Programs are underway at all locations to conserve energy and, where fea-

sible, to adapt operations to changes in fuel and feedstock brought about by the energy crisis.

International: Gulf Canada's chemical operations were improved by price and volume increases. The signing of major sales contracts for ethylene and propylene, the latter for feedstock to Canada's first polypropylene plant, improves the outlook for these operations.

Gulf's olefin plant at Europoort, Holland, operated at high levels during much of the year; however, the embargo of oil shipments from the Middle East resulted in some loss of production during December. A modest expansion program was started.

The commissioning of the naphtha cracker of Korea Oil Corporation, 50-percent Gulf-owned, was completed early in the year. Plants to supply butadiene and cyclohexane were brought on stream. In Taiwan, China-Gulf Plastics, which is 62 percent Gulf-owned, achieved new sales and profit records.

Research and Development

Automotive gasoline quality will be changed to meet Environmental Protection Agency regulations. After July 1 the larger volume retail outlets must provide at least one grade of unleaded gasoline (less than 0.05 grams of lead per gallon). To make certain that the new Gulfcrest does not exceed that limit, Low Level Lead test kits have been developed with the American Society for Testing and Materials. The kits will provide a rapid and accurate lead-level analysis at the service station.

Extensive exploration activity required a major increase in computer capacity to process added geophysical data.

Another source of energy—uranium—can be extracted from phosphate rock. This rock is converted to phosphoric acid for use in the fertilizer industry. The acid contains about one pound of uranium (as oxide) per ton as an impurity. Through a process developed by Gulf Research, over 90 percent of this uranium can be recovered at a price equal to present-day mining and milling operations. The Gulf process has been designed into a mobile pilot plant which will be used this year for demonstration at commercial phosphoric acid plant sites in Florida.

Continued pilot plant development has

demonstrated that Gulf's HDS (hydrodesulfurization) Process for producing low-sulfur residual fuels from atmospheric tower bottoms can now be extended to use with vacuum tower bottoms. In addition, several other process improvements are expected to substantially reduce HDS investment and operating costs. These advances will enhance the status of Gulf's HDS Process which has already gained a good reputation in the industry as evidenced by the three operating units and the seven more under construction and/or design for other companies.

A new transformer oil, Gulf Transcrest H, is manufactured by Gulf Finishing, a hydrogenation process, which replaces the traditional acid process. Among other industrial and automotive oil developments were a series of three Gulf-knit oils for use in textile industry doubleknit equipment and a motor oil especially designed for the new rotary automotive engines.

New Energy Sources



Nuclear: A new partnership was formed with the Royal Dutch/Shell Group of Companies to own and operate the business previously conducted by Gulf Energy & Environmental Systems.

The Gulf-Royal Dutch/Shell venture will operate two 50-50 partnership companies: General Atomic Company and General Atomic International. C. A. Rolander, President of the former Gulf

Energy & Environmental Systems, is President of both new partnerships. Each will be directed by a six-member partnership committee appointed by the respective partners.

General Atomic Company and General Atomic International will manufacture and market High Temperature Gas-cooled Reactor (HTGR) systems for central station electric power plants, and will develop and market other advanced nuclear products and services.

At year end, as the Fort St. Vrain Nuclear Generating Station approached its start-up on the system of Public Service Company of Colorado, work continued at General Atomic Company in San Diego on six larger HTGR units in the 770,000 and 1,160,000 kilowatt range, which have been selected by U. S. utility companies. They are twin-reactor power stations being built by Philadelphia Electric Company, Delmarva Power & Light Company, and Southern California Edison Company.

Advanced HTGR systems are also attracting increasing recognition. Seventeen utilities, the Atomic Energy Commission, and General Atomics are participating in a program to develop an HTGR direct-cycle gas turbine power plant system.

The Gas-Cooled Fast Breeder Reactor (GCFR) development program has grown to include participation by 58 U. S. utilities, 52 rural electrical cooperatives, and four European power companies. Also, AEC support of the GCFR increased.

Interest has been developing in the potential of the HTGR to provide heat for such uses as industrial-process heat needs, coal gasification, and steelmaking. General Atomic, Stone & Webster, and the San Diego Gas & Electric Company initiated a new joint program to develop a process for converting coal into pipeline-quality gas and clean liquid fuels, using the HTGR as the source of process heat. Another program supported by Southern California Edison and Northeast Utilities will study the use of the HTGR to provide process heat at high temperatures for the economic production of hydrogen from water.

Controlled fusion research continues at General Atomic, supported by the AEC and the Electric Power Research Institute.

General Atomic International (GAI) opened a new office in Tokyo, and General Atomic Europe, GAI's Zurich-based subsidiary, opened a new office in Lon-

don. Equity and licensing agreements have been formed in France and Germany and are being discussed in the United Kingdom and Japan.

Allied-Gulf Nuclear Services, a partnership of General Atomic and Allied Chemical Nuclear Products, Inc., is building the country's largest commercial light water reactor fuel reprocessing facility near Barnwell, S. C. The plant, about 60 percent complete, is scheduled to go into operation in late 1975.

Gulf announced that it intends to divest its light water reactor fuel fabrication operations, now carried on by its division, Gulf Nuclear Fuels.

Uranium: Exploration and development activities continued at an accelerated pace. In the U. S., Gulf Mineral Resources Co. made significant additions to the reserves held in New Mexico through discovery and acquisitions. This makes Gulf one of the largest uranium reserve holders in the U. S. Additional prospective acreage was acquired in other western states. Detailed engineering and environmental programs are now underway in New Mexico which will lead to major projects in the near future, assuring Gulf's position as a significant domestic uranium ore producer.)

In Canada, Gulf Minerals Canada Limited is on schedule with a mine and mill development program at Rabbit Lake, Saskatchewan. When it comes on stream in 1975, this property will be one of the important uranium producers in the world. Exploration is continuing in the Rabbit Lake area and elsewhere in Canada.

Coal: The Pittsburg & Midway Coal Mining Co., a wholly owned subsidiary, brought into production the new Midway surface mine, 50 miles south of Kansas City. A second dragline was completed, increasing total mine productive capacity to more than 2,000,000 tons per year. All production of this mine is sold directly to utility companies operating a power plant adjacent to the mine.

Expansion of the McKinley mine near Gallup, New Mexico, is continuing as planned; the first two draglines are on order. The first is scheduled for completion by mid-1975, the second in 1976. Commitments have been made to increase sales from the present 400,000 tons per year to approximately 3,000,000 tons by 1977.

During the year land reclamation efforts were bolstered with the addition of

a new 40-foot angle blade and a revolutionary drag bar, both of which allow substantial reductions in reclamation costs.

Synthetic Fuels: Gulf continued its study of deposits in the U. S. and Canada of coal, oil shale, and bituminous sands suitable for the production of synthetic fuels. A new division, Gulf Energy and Minerals Company (GEM), was formed to focus effort on these new energy sources.

In January, 1974, Gulf and a partner were successful bidders on a 5,000-acre shale-oil tract near Rifle, Colorado. Development will proceed as rapidly as technical, environmental and economic factors permit. It is estimated that it will be some time in the 1980s before fuel can be supplied from this operation.

Gulf continues to participate in a number of research and development programs designed to convert high sulfur coal into environmentally acceptable fuels. Substantial coal reserves are held in Montana for ultimate synthetic fuels production.

In December, Gulf Canada and partners entered into an agreement with the Alberta Government to proceed with a 125,000-barrel-per-day bituminous sands project. This project involves mining, extracting and upgrading of bitumen into a high quality synthetic crude oil. It should be operating by 1978.

Other Investments

Gulf's involvement in real estate—through its subsidiaries, the Gulf Oil Real Estate Development Company (GORED CO) and Gulf Reston, Inc.—continued to accelerate. In the planned town of Reston, the number of residential transactions completed set a record for its ten-year history despite the general downturn in the housing construction industry.

With foreign dignitaries from 22 countries attending, the Dag Hammarskjold Plaza and the Reston International Center were formally dedicated on September 29.

At the Florida Center project in Orlando the first residential condominium units were started and the first office building was completed. Completion of development plans and granting of city approval allowed construction to start at Ocean Village of Hutchinson Island, Fort Pierce, Florida, GORED CO's second Florida project.

Financial Information

The year 1973 was an unusual year for all petroleum companies, including Gulf. Our revenues and profits set new records and were subject to much criticism because of the energy shortage. The attention which was focused on the petroleum industry because of the shortage generated considerable confusion with regard to the functions and earnings of petroleum companies. In addition, the Securities and Exchange Commission (SEC) indicated that they believe Annual Reports to Shareholders should contain as much detail financial information as required in the Annual Report Form 10-K filings with the Commission. In an effort to present information which will assist the shareholder in obtaining a fuller understanding of the financial aspects of the Company's operations, we have expanded and added to the financial information included in this Annual Report. Copies of our Form 10-K as filed with the SEC are available to shareholders upon request. However, this Annual Report to Shareholders is incorporated in the Form 10-K in satisfaction of the financial information disclosure requirements of the SEC.

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Financial Review

Earnings

Earnings in 1973 were \$800 million, equal to \$4.06 a share compared with abnormally low 1972 earnings of \$447 million equal to \$2.15 a share before an extraordinary write-off of \$250 million. The \$353 million increase in earnings represents an increase of 79% over 1972 which was our lowest profit year since 1965. Compared to our previous high profit year of 1968, in which earnings were \$626 million, 1973 earnings represent a compounded annual increase of only 5%. Geographic distribution of income by line of business is presented in footnote 2 of the financial statements.

Petroleum operations in the United States earned \$480 million in 1973, a 14 percent increase over 1972 earnings of \$420 million, before considering amortization of non-producing leases and exploration and dry hole expenses which totaled \$116 million in 1973 as compared to \$63 million in 1972. The increase in U.S. petroleum operations was due primarily to a 12.3 percent increase in refined product sales volumes. Product price increases received by the Company reflect the recovery of increased costs as approved by the Cost of Living Council. Production of crude oil declined about 8 percent but was more than offset by significant increases in crude oil imports which enabled the Company to increase refinery runs to 96 percent of capacity, compared with 90.5 percent in 1972. The increase of \$53 million in amortization of non-producing properties and exploration and dry hole expenses includes the write-off of our Alaskan oil leases.

Foreign petroleum operations had net earnings of \$560 million in 1973 compared with \$150 million in 1972 and reflected the increase in product prices in all of the Company's overseas markets, particularly in the fourth quarter. In addition, European sales volumes were 6 percent higher than anticipated, and the increased capacity of the Company's tanker fleet reduced dependence on the charter market.

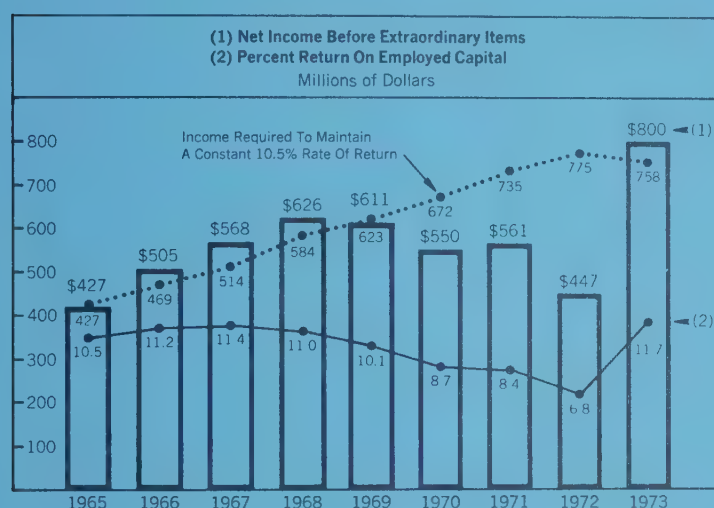
Foreign crude oil and condensate production, including that purchased under participation agreements, declined 1.4 percent with increased volumes from Ecuador, Venezuela, Canada, Nigeria and Cabinda largely compensating for declines in the Middle East.

In both domestic and foreign operations, the profits also reflect the benefits of the disposal of marginal operations in the U.S., Germany, Colombia, Spain and the Philippines, and the continuing benefit of cost control programs throughout the Company.

Chemical operations included a profit increase of \$13 million in the U.S., due primarily to improved results of the Plastics Division and the elimination of certain plastic products activities and an increase of \$39 million in foreign activities, reflecting improved operations, particularly in Europoort where start-up difficulties were experienced in 1972.

Nuclear operations, which are primarily confined to the United States, experienced an increased loss of \$102 million in 1973. This reflects the very high cost of establishing the sophisticated technology of the Company's high-temperature gas-cooled reactors, and particularly losses associated with construction of the first group of commercial-sized nuclear power plants to be built using the Company's design.

The rate of return on average employed capital for 1973 was 11.7% on \$7.7 billion of capital employed in the business and approximates the Company's previous record rate of return which was achieved in 1967 on employed capital of \$5.5 billion. Percent return on employed capital in the years between 1967 and 1973 ranged steadily downward to a low of 6.8% in 1972. The following chart compares the Company's percent return on employed capital with income and indicates the income which would have been required to maintain a constant 10.5% rate of return in each of the years.



Expenditures

Expenditures by the Company for the expansion, improvement and replacement of properties including exploration and dry hole expense amounted to \$940 million in 1973 compared to \$819 million in 1972 and were distributed as follows:

	Millions of Dollars		% of Earnings Before Exploration Expense	
	1973	1972	1973	1972
Exploration and Production				
United States	\$432	\$329	45%	56%
Foreign	203	169	21	29
Total	635	498	66	85
Marketing	94	99	10	17
Refining	63	85	6	14
Transportation	84	73	8	13
Chemicals	24	19	3	3
Natural Gas Liquids	17	19	2	3
Other	23	26	3	4
	<u>\$940</u>	<u>\$819</u>	<u>98%</u>	<u>139%</u>

As indicated above, earnings before exploration expense which are invested in the business are still inadequate to finance the heavy capital expenditures necessary for replacement of plant and oil and gas reserves, as well as requirements for new energy resources. The Company's 1974 Capital and Exploration Program is approximately \$2 billion of which approximately \$1.5 billion will be spent in searching for new supplies of energy.

Long-Term Debt

In 1973 the Company continued its program of reducing long-term debt. The balance of \$1,608 million at December 31, 1973 was \$333 million less than the 1972 year-end balance. This significant reduction was achieved through scheduled repayments and by prepayments of \$193 million, substantially all of which was debt payable in foreign currencies subject to the effects of currency rate fluctuations. Debt payable in foreign currencies was reduced by 35% in 1973 and currently represents 27% of total long-term debt compared with 34% at December 31, 1972.

Working Capital

Working capital at December 31, 1973 was \$1,514 million, an increase of \$70 million from December 31, 1972. Although the net increase in working capital was minor in 1973, both current assets and current liabilities were more than \$900 million higher than at December 31, 1972. For the most part these increases reflect the effect of significantly higher crude oil prices and costs in 1973.

Other

The Company was able to hold operating, selling, general and administrative expenses, and interest on long-term debt to an aggregate increase of approximately 7% over 1972. However, significant increases occurred in expenses which are subject to outside influences such as the cost of purchased crude oil, products and merchandise which in 1973 was \$2,833 million, an increase of 61% over 1972. Total tax expense in 1973 was \$3,067 million, an increase of 26% over 1972.

Consolidated Statement of Income and Retained Earnings

	Millions of Dollars	
	Year Ended December 31	
	1973	1972
REVENUES		
Sales and other operating revenues	\$ 9,843	\$7,624
Dividends, interest, equity earnings and other revenues (Note 5)	164	109
	<u>10,007</u>	<u>7,733</u>
DEDUCTIONS		
Purchased crude oil, products and merchandise	2,833	1,763
Operating expenses	1,618	1,447
Selling, general and administrative expenses	944	921
Taxes on income and general taxes (Note 6)	3,067	2,432
Depreciation, depletion, amortization and retirements (Notes 7 and 9)	610	576
Interest on long-term debt	135	147
	<u>9,207</u>	<u>7,286</u>
INCOME BEFORE EXTRAORDINARY ITEM	800	447
EXTRAORDINARY ITEM (Note 10)	—	(250)
NET INCOME	800	197
RETAINED EARNINGS AT BEGINNING OF YEAR	3,929	4,043
CASH DIVIDENDS	(296)	(311)
RETAINED EARNINGS AT END OF YEAR	<u>\$ 4,433</u>	<u>\$3,929</u>
PER SHARE DATA		
Income Before Extraordinary Item	\$ 4.06	\$ 2.15
Extraordinary Item	—	(1.20)
Net Income	\$ 4.06	\$.95
Cash Dividends	\$ 1.50	\$ 1.50

The notes on pages 15 to 24 are an integral part of the financial statements.

Consolidated Statement of Financial Position

	Millions of Dollars December 31	
	1973	1972
ASSETS		
Current Assets		
Cash	\$ 135	\$ 76
Marketable securities, at cost, approximating market value	921	562
Receivables (Note 3)	2,124	1,581
Inventories (Note 4)	669	667
Prepaid expenses	69	50
Total Current Assets	3,918	2,936
Realizable Value (Net)—Discontinued Operations (Note 10)	—	67
Investments in Associated Companies (Note 5)	238	278
Other Investments and Long-Term Receivables (Note 8)	426	481
Properties (Note 9)	5,468	5,418
Deferred Charges	24	144
TOTAL ASSETS	<u>\$10,074</u>	<u>\$9,324</u>
LIABILITIES		
Current Liabilities		
Notes payable and current long-term debt (Note 11)	\$ 119	\$ 181
Accounts payable	752	345
Consumer sales and excise taxes payable	118	104
Lease bonus payable to U. S. Government	139	—
Accrued rents and royalties	100	61
Accrued United States and foreign income taxes	601	333
Other current liabilities	575	468
Total Current Liabilities	2,404	1,492
Long-Term Debt (Note 11)	1,608	1,941
Deferred Income Taxes (Note 6)	105	141
Other Liabilities	122	94
Minority Interests (Note 15)	266	247
TOTAL LIABILITIES	<u>4,505</u>	<u>3,915</u>
SHAREHOLDERS' EQUITY		
Capital Stock—authorized 300,000,000 shares, without par value; issued 211,910,826 and 211,906,626 shares, respectively, stated at	883	883
Paid-In Capital	698	698
Retained Earnings	4,433	3,929
	6,014	5,510
Less 17,295,369 and 4,209,655 shares, respectively, in treasury, at cost (Note 18)	445	101
TOTAL SHAREHOLDERS' EQUITY	5,569	5,409
TOTAL LIABILITIES AND SHAREHOLDERS' EQUITY	<u>\$10,074</u>	<u>\$9,324</u>

The notes on pages 15 to 24 are an integral part of the financial statements.

Consolidated Statement of Changes in Financial Position

	Millions of Dollars Year Ended December 31	
	1973	1972
FINANCIAL RESOURCES WERE PROVIDED BY		
Income before extraordinary item	\$ 800	\$ 447
Income charges (credits) not affecting working capital		
Depreciation, depletion, amortization and retirements	610	576
Deferred income taxes	12	11
Income applicable to minority interests	36	22
Net gain from sales of properties and investments	(24)	(1)
Foreign exchange translation loss related to long-term debt	4	43
Undistributed loss (earnings) of affiliated and associated companies including nuclear partnership	122	(8)
Working capital from operations	1,560	1,090
Proceeds from sales of properties and investments	106	207
Repayments and other reductions of investments and long-term receivables	149	115
Long-term borrowings	60	129
Net proceeds from divestment of operations discontinued in 1972	56	—
Other—Net	11	14
	<u>1,942</u>	<u>1,555</u>
FINANCIAL RESOURCES WERE USED FOR		
Properties	784	678
Business investments	39	40
Properties of subsidiaries acquired	—	8
Reduction of long-term debt	397	331
Cost of treasury stock acquired	344	—
Cash dividends to Gulf shareholders	296	311
Cash dividends to minority shareholders	12	11
	<u>1,872</u>	<u>1,379</u>
INCREASE IN WORKING CAPITAL	<u>\$ 70</u>	<u>\$ 176</u>
INCREASE (DECREASE) IN WORKING CAPITAL		
Cash	\$ 59	\$ (36)
Marketable securities	359	87
Receivables	543	281
Inventories	2	15
Prepaid expenses	19	(63)
Notes payable and current long-term debt	62	(30)
Accounts payable	(407)	(32)
Consumer sales and excise taxes payable	(14)	(5)
Lease bonus payable to U. S. Government	(139)	—
Accrued rents and royalties	(39)	2
Accrued United States and foreign income taxes	(268)	(12)
Other current liabilities	(107)	(31)
	<u>70</u>	<u>176</u>
WORKING CAPITAL AT BEGINNING OF YEAR	<u>1,444</u>	<u>1,268</u>
WORKING CAPITAL AT END OF YEAR	<u>\$1,514</u>	<u>\$1,444</u>

The notes on pages 15 to 24 are an integral part of the financial statements.

Notes to Financial Statements

Note 1—Summary of Accounting Policies

This summary of the major accounting policies of Gulf Oil Corporation and its consolidated subsidiaries is presented to assist the reader in evaluating the Company's financial statements. The accounting policies employed by the Company are in accordance with generally accepted accounting principles. In those instances in which more than one generally accepted accounting principle can be applied, the Company has adopted the accounting principle which it believes most accurately and fairly reflects its operating results.

Exploration and Development Expenditures

In the petroleum industry the most significant accounting policy relates to the method of accounting for exploration and the development of oil and gas reserves. In this regard, the Company's capitalization policy follows the "successful effort" concept except that successful geological and geophysical costs are not capitalized. All exploratory costs including geological and geophysical costs, annual delay rentals on undeveloped leases and all dry hole costs are charged to income as incurred.

Depreciation, Depletion, Amortization and Retirements

Provisions for depreciation and depletion of lease and well equipment, intangible drilling costs applicable to productive wells, and undeveloped and developed leasehold costs represent charges per unit of production based on the estimated proved and developed oil and gas reserves in each country, except in the Middle East where such provisions are determined on a straight-line basis.

Provisions for depreciation and amortization of properties other than those of the exploration and production departments are generally determined on the group basis using the straight-line method based on estimated remaining economic useful lives of groups of related properties. Under this method rates are revised when a change in life expectancy becomes apparent. Maintenance and repairs are charged to income, and renewals and betterments which extend the physical or economic life of the properties are capitalized.

Properties retired or otherwise disposed of are eliminated from the property accounts and the amounts, after adjustment for salvage and dismantling expenses, are charged to accumulated depreciation or depletion. Only gains and losses on extraordinary retirements, retirements involving entire groups of properties, and properties retired or otherwise disposed of by certain foreign subsidiaries are charged or credited to income.

Principles of Consolidation

The accounts of Gulf Oil Corporation and all subsidiary companies more than 50% owned are included in the consolidated financial statements except for those engaged in real estate activities and a domestic financing subsidiary. The real estate and financing subsidiaries (affiliated companies) and all other investments 20% to 50% owned (associated companies) are substantially accounted for on an equity basis.

Translation of Foreign Currency

Balances and transactions in foreign currencies have been translated to United States dollars as follows: long-term investments and properties—at rates current on dates of acquisition; accumulated depreciation, depletion and amortization and related provisions against income—on the basis of dollar value of the related assets; all other assets and liabilities—at rates current at end of period; and operating income and other expenses—at average monthly rates. Gains or losses on foreign currency translation are included in results of operations in the period incurred.

Inventory Valuation

Crude oil, petroleum products and certain chemicals and merchandise inventories generally are valued at average cost applied on the "last-in, first-out" basis (LIFO), which in the aggregate is lower than market value. Inventories of Canadian subsidiaries generally are valued at the lower of cost applied on a "first-in, first-out" basis or market value. All other product and merchandise inventories generally are valued at the lower of average cost or market. Materials and supplies generally are valued at cost or less depending on the condition of the items.

Research and Development Expenditures

Research and development expenditures are charged to income as incurred.

Costs relative to a development program in the nuclear energy field, deferred at December 31, 1972, were transferred as part of the Company's contribution to the new partnership described in Note 5.

Income Taxes

The Company practices interperiod tax allocation with respect to all significant temporary timing differences.

The current income tax provision is reduced by the amount of the realizable investment tax credit.

Pensions

Pension costs are funded as accrued. Unamortized prior service costs are amortized over varying periods for the different plans but for no more than fifteen years.

Goodwill

Goodwill arising from acquisitions accounted for as purchase transactions is amortized over its estimated beneficial life. The only unamortized goodwill currently reflected in the consolidated accounts is an insignificant amount recorded in the accounts of the Canadian subsidiaries.

Earnings Per Share

Earnings per share is calculated based upon the weighted average of the number of shares outstanding during the year.

Note 2—Geographic Distribution

Geographic distribution by line of business of sales and other operating revenues and income before extraordinary

item, and geographic distribution of employed capital and net assets is as follows:

	Millions of Dollars					
	Total		U. S.		Foreign	
	1973	1972	1973	1972	1973	1972
Sales and Other Operating Revenues						
Petroleum	\$9,307	\$7,172	\$4,260	\$3,630	\$5,047	\$3,542
Chemicals	455	363	285	225	170	138
Nuclear	33	34	33	34	—	—
Minerals	47	42	47	42	—	—
Other	1	13	1	13	—	—
	<u>\$9,843</u>	<u>\$7,624</u>	<u>\$4,626</u>	<u>\$3,944</u>	<u>\$5,217</u>	<u>\$3,680</u>
Income (Loss) Before Extraordinary Item						
Petroleum						
Producing, Refining and Marketing Operations ...	\$1,139	\$ 658	\$ 480	\$ 420	\$ 659	\$ 238
Amortization of Non-Producing Leases and Exploration and Dry Hole Expense	(215)	(151)	(116)	(63)	(99)	(88)
Chemicals	27	(25)	10	(3)	17	(22)
Nuclear	(133)	(31)	(132)	(31)	(1)	—
Minerals	(8)	(5)	(6)	(3)	(2)	(2)
Other	(10)	1	(10)	1	—	—
	<u>\$ 800</u>	<u>\$ 447</u>	<u>\$ 226</u>	<u>\$ 321</u>	<u>\$ 574</u>	<u>\$ 126</u>
Employed Capital and Net Assets—December 31						
Working Capital	\$1,514	\$1,444	\$ 424	\$ 567	\$1,090	\$ 877
Properties	5,468	5,418	3,309	3,236	2,159	2,182
Investments and Other Assets	688	970	151	320	537	650
Employed Capital	<u>7,670</u>	<u>7,832</u>	<u>3,884</u>	<u>4,123</u>	<u>3,786</u>	<u>3,709</u>
Long-Term Debt	1,608	1,941	758	765	850	1,176
Other Liabilities	493	482	99	120	394	362
Net Assets	<u>\$5,569</u>	<u>\$5,409</u>	<u>\$3,027</u>	<u>\$3,238</u>	<u>\$2,542</u>	<u>\$2,171</u>

Note 3—Receivables

	Millions of Dollars	
	December 31	
	1973	1972
Customers	\$1,627	\$1,096
Affiliated and associated companies	119	263
Other receivables	403	253
	<u>2,149</u>	<u>1,612</u>
Less: Reserve for doubtful accounts	25	31
	<u>\$2,124</u>	<u>\$1,581</u>

In 1973 and 1972 provisions of \$22 and \$35 million, respectively, were credited to the reserve for doubtful accounts. Other reserve charges and credits, principally write-offs and recoveries, were \$31 and \$3 million, respectively, in 1973 and \$27 and \$3 million, respectively, in 1972.

Note 4—Inventories

	Millions of Dollars	
	December 31	
	1973	1972
Crude oil	\$109	\$106
Petroleum products	379	381
Chemicals, merchandise and other	67	81
Materials and supplies	114	99
	<u>\$669</u>	<u>\$667</u>

The book value of LIFO inventories was \$340 and \$365 million which was \$219 and \$58 million less than current cost at December 31, 1973 and 1972, respectively.

Materials and supplies and certain taxes on products carried in inventory are not included in the computation of cost of sales. The inventory amounts used in the computation of cost of sales were \$544, \$550 and \$533 million at December 31, 1973, 1972 and 1971, respectively.

Note 5—Investments in Associated Companies

The Company's investments in associated companies are summarized as follows:

	Millions of Dollars	
	December 31	
	1973	1972
Current assets	\$339	\$238
Properties	477	549
Other assets	70	18
Total assets	<u>886</u>	<u>805</u>
Less:		
Current liabilities	175	184
Long-term debt	328	296
Other liabilities	145	47
Total liabilities	<u>648</u>	<u>527</u>
	<u>\$238</u>	<u>\$278</u>

As of December 31, 1973, the Company was contingently liable for guarantees of debt of associated companies in the amount of \$100 million.

The Company's equity in earnings of associated companies is summarized as follows:

	Millions of Dollars	
	December 31	
	1973	1972
Revenues	\$586	\$465
Less:		
Operating expenses	496	315
Selling and administrative expenses	61	120
Taxes	14	15
	<u>571</u>	<u>450</u>
	<u>\$ 15</u>	<u>\$ 15</u>

Effective July 1, 1973, the Company entered into a partnership under which the Company and the Royal Dutch/Shell Group of Companies own and operate, on a 50-50 basis, the business which had previously been conducted by the Company's division, Gulf Energy & Environmental Systems (GEES). The Company's original investment in this partnership included the net assets of GEES and the net unamortized balance of deferred research and development expenditures relative to a development program in the nuclear energy field. The Company has included its investment in this partnership in "Investments in Associated Companies". However, the Company's proportionate share of all of the partnership's revenue and expense accounts have been included on a pro-rata basis in the Consolidated Statement of Income and Retained Earnings. See Note 2 for information as to the revenues and net income attributable to the Company's nuclear operations.

Note 6—Taxes

	Millions of Dollars	
	1973	1972
United States Taxes		
Consumer excise	\$ 761	\$ 737
Sales, use, ad valorem and other	122	122
Current income	23	12
Deferred income	12	(6)
Total United States Taxes	<u>918</u>	<u>865</u>
Foreign Taxes		
Consumer excise	665	644
Sales, use, ad valorem and other	143	106
Current income	1,341	800
Deferred income	—	17
Total Foreign Taxes	<u>2,149</u>	<u>1,567</u>
	<u>\$3,067</u>	<u>\$2,432</u>

No interperiod tax allocation has been recognized for the Company's share of the undistributed earnings of certain consolidated subsidiaries in the amount of \$581 million at December 31, 1973 since these earnings are considered to be permanently invested. Application of the Company's policy of reducing the current income tax provision by the amount of realizable investment tax credit did not have a material effect on income in either year.

The individual tax effects of timing differences, principally depreciation, geological and geophysical costs, non-producing leasehold costs, and foreign currency exchange adjustments, were less than 2% of total pretax income in both years.

Total income tax expense amounted to \$1,376 and \$823 million which equates to effective tax rates of 63% and 65% on earnings before income taxes and extraordinary items for 1973 and 1972, respectively. Reasons for the difference between effective rates and the United States tax rate are as follows:

	% Of Pretax Income	
	1973	1972
United States statutory tax rate	48%	48%
Increase (decrease) resulting from:		
Foreign taxes at rates in excess of the U. S. tax rate on foreign source income subject to U. S. tax	26	28
Foreign taxes on foreign source income not subject to U. S. tax	1	6
Allowable depletion in excess of cost depletion.	(12)	(17)
	<u>63%</u>	<u>65%</u>

Note 7—Exploration and Development Expenditures

Expenditures for exploration and development charged to expense and those capitalized in accordance with

Company policy as described in Note 1 are summarized as follows:

	Millions of Dollars					
	Expenditures Charged to Expense-Year		Expenditures Capitalized-Year		Net Capitalized Expenditures December 31	
	1973	1972	1973	1972	1973	1972
Oil and Gas						
United States	\$ 54	\$ 49	\$349	\$262	\$1,476	\$1,359
Canada	38	36	18	13	140	138
Latin America	4	5	32	21	115	101
Middle East	—	—	2	10	68	111
Africa	24	25	45	29	231	245
Europe	20	4	1	5	1	3
Asia	12	17	—	—	4	5
	<u>152</u>	<u>136</u>	<u>447</u>	<u>340</u>	<u>2,035</u>	<u>1,962</u>
Minerals						
Coal						
United States	—	—	11	14	75	71
Uranium						
United States	3	3	15	1	60	46
Canada	1	2	6	2	11	5
	<u>4</u>	<u>5</u>	<u>32</u>	<u>17</u>	<u>146</u>	<u>122</u>
	<u>\$156</u>	<u>\$141</u>	<u>\$479</u>	<u>\$357</u>	<u>\$2,181</u>	<u>\$2,084</u>

Of the net capitalized costs, \$308 and \$231 million relate to non-producing properties at December 31, 1973 and 1972, respectively. These costs are being amortized in accordance with the Company's policy as described in Note 1 except that the costs relative to uranium properties will be amortized when commercial production is obtained.

Of the total "proved" oil and gas reserves of the Company, only those that are "developed" are used in the computation of unit-of-production amortization. The developed oil reserves, including gas reserves converted to equivalent barrels, and the effective rates of amortization are as follows:

	Millions of Barrels		Effective Rate of Amortization*	
	December 31			
	1973	1972	1973	1972
Unit of Production				
United States	1,532	1,666	16.0%	12.5%
Canada	504	533	11.2%	9.2%
Latin America	610	472	15.8%	19.1%
Africa	814	855	23.3%	20.0%
Straight Line				
Middle East			7.3%	6.2%
Coal			5.5%	6.0%

* The effective rate of unit-of-production amortization is based upon average net investment and the effective rate of straight-line amortization is based upon average gross investment.

Note 8—Other Investments and Long-Term Receivables

	Millions of Dollars	
	December 31	
	1973	1972
Investments		
Affiliates (stated at equity)	\$ 45	\$ 29
Others (stated at cost)	23	19
Long-term receivables	358	433
	<u>\$426</u>	<u>\$481</u>

In 1970, the Company reached agreement with the Bolivian Government with respect to compensation for its properties in Bolivia seized by that Government. The amount of indemnification is to be paid without interest over a period of not more than twenty years and is contingent upon exportation of sufficient hydrocarbons from certain fields within that period. The net receivable was \$72 and \$78 million of which \$13 and \$4 million was classified as a current receivable at December 31, 1973 and 1972, respectively. This indemnification is currently being collected at a rate ahead of that which was originally anticipated.

Note 9—Properties

	Millions of Dollars							
	December 31				Year			
	Gross Investment At Cost		Net Investment		Depreciation, Etc. Charged to Income		Capital Expenditures	
	1973	1972	1973	1972	1973	1972	1973	1972
Exploration & Production*	\$ 5,340	\$ 5,106	\$2,181	\$2,084	\$348	\$288	\$479	\$357
Marketing	1,808	1,836	1,088	1,128	87	111	94	99
Refining	1,803	1,757	937	917	63	66	63	85
Transportation	1,011	979	628	599	43	40	84	73
Chemicals	616	615	366	390	41	40	24	19
Natural Gas Liquids	363	349	166	168	16	15	17	19
Other*	182	220	102	132	12	16	23	26
	<u>\$11,123</u>	<u>\$10,862</u>	<u>\$5,468</u>	<u>\$5,418</u>	<u>\$610</u>	<u>\$576</u>	<u>\$784</u>	<u>\$678</u>
United States	\$ 6,989	\$ 6,792	\$3,309	\$3,236	\$372	\$332	\$505	\$410
Canada	1,315	1,276	690	693	71	63	74	62
Latin America	775	776	237	235	30	35	40	47
Middle East	259	344	79	127	18	18	2	10
Africa	453	418	231	245	59	52	45	29
Europe	739	722	491	496	35	51	41	45
Asia	48	47	30	33	4	7	3	16
Foreign Flag Tankers	545	487	401	353	21	18	74	59
	<u>\$11,123</u>	<u>\$10,862</u>	<u>\$5,468</u>	<u>\$5,418</u>	<u>\$610</u>	<u>\$576</u>	<u>\$784</u>	<u>\$678</u>

* 1972 Data reclassified for comparative purposes.

Note 10—Extraordinary Item

On October 9, 1972, the Board of Directors of the Company approved the sale or other disposal of certain unprofitable or marginal investments which were not achieving a satisfactory rate of return. The planned divestment included the following properties: substantially all of the retail marketing outlets and related distribution facilities located in the upper midwestern and northwestern sections of the United States; a small refinery on the U. S. West Coast; a refinery and all marketing operations and related distribution facilities in Germany; a majority-owned refinery in the Philippines; and production facilities in Colombia, South America.

The provision of \$250 million represented management's best estimate of the total loss which would be realized in disposing of the properties and included estimates of recoverable salvage value, all foreseeable costs associated with the disposals and estimated losses to be incurred in operating the facilities from September 30, 1972 to the dates of disposal.

Revenues, net loss and net loss per share, considering the applicable income tax effect, attributable to these discontinued operations and included in the consolidated statement of income were \$331 million, \$27 million and \$.13 per share, respectively, for the year ended December 31, 1972, and represented operating results through September 30, 1972. Subsequent to that date, results of the discontinued operations were charged to Realizable Value (Net)—Discontinued Operations.

Realizable Value (Net)—Discontinued Operations, as reflected in the consolidated statement of financial position at December 31, 1972, represented the then remaining salvage value estimated to be recoverable from properties to be divested, less estimated operating losses,

termination and other costs expected to be incurred up to the date of disposal.

At December 31, 1973 the divestment program, except for the small refinery and marketing outlets retained as noted below, has been completed and resulted in a loss of \$244 million. The unused provision of \$6 million has been recorded as a credit to 1973 income. A comparison of the final loss to the original estimate is as follows:

	Millions of Dollars		
	Estimated Losses	Final Losses	Increase (Decrease)
Loss on properties	\$169	\$205	\$ 36
Termination and other costs	30	17	(13)
Cash operating losses	28	11	(17)
Loss on receivables and long-term investments	23	21	(2)
Tax effect	—	(10)	(10)
	<u>\$250</u>	<u>\$244</u>	<u>\$ (6)</u>

Several economic factors, all directly related to the energy shortage and the continually increasing cost of crude oil, had an effect on the final loss.

Prospective purchasers of the small West Coast refinery were unwilling to purchase the refinery without a related long-term crude oil supply contract. As a result, the Company made the decision to retain the refinery and approximately 100 marketing outlets which it serves. The favorable effect on the final loss resulting from the retention of the refinery and related marketing outlets was more than offset by higher than anticipated losses on the disposals of marketing properties, both domestic and foreign. The Company was unable to realize the originally estimated salvage value because the shortage of petroleum products limited the number of purchasers who might otherwise have been willing to purchase such properties.

Note 11—Long-Term Debt

	Millions of Dollars	
	December 31	
	1973	1972
United States Dollars		
8½% sinking fund debentures due in 1995.....	\$ 200	\$ 200
6¾% sinking fund debentures due in 1993.....	200	200
5.35% sinking fund debentures due in 1991.....	78	87
7 to 9% debentures due 1974 through 1987.....	167	173
3 to 6½% notes payable 1974 through 1990.....	257	330
7¼ to 8¾% notes payable 1974 through 1981.....	101	174
3 to 5.3% bonds due 1974 through 1997.....	120	136
Other obligations	111	81
	<u>1,234</u>	<u>1,381</u>
Foreign Currencies		
German marks—6½ to 7½% payable 1974 through 1986.....	48	192
Canadian dollars—3½ to 8¾% payable 1974 through 1990.....	191	187
Swiss francs—5 to 8½% payable 1974 through 1985.....	131	179
Italian lire—8% payable 1974 through 1985	62	66
Other currencies	22	76
	<u>1,688</u>	<u>2,081</u>
Included in Current Liabilities	80	140
	<u>\$1,608</u>	<u>\$1,941</u>

Approximate maturities in the years 1975 through 1978 are \$99, \$146, \$63 and \$133 million, respectively.

Note 12—Pension Plans

The Company has various pension programs covering substantially all of its employees. As of January 1, 1973 the Company's principal program was amended to provide additional benefits for employees. The effect of this change on net income was not material. The provisions charged to income for the years 1973 and 1972 were \$55 and \$42 million, respectively. As of December 31, 1973 estimated unamortized prior service costs aggregated approximately \$106 million. Assets of the principal pension funds exceeded the actuarially computed value of vested benefits at December 31, 1973.

Effective January 1, 1974 the Company's principal program has been amended to provide additional benefits for employees. The prior service costs to be added to the unamortized prior service costs are estimated to be approximately \$77 million. The effect of this change on future net income is not expected to be material.

Note 13—Contingent Liabilities

The Company was contingently liable for guarantees of loans payable by owners of service stations and others in the amount of \$71 million, and also for loans payable by associated companies as described in Note 5. The Company has other contingent liabilities and claims which management believes will not result in losses of any consequence.

The terms of a gas sales contract provide for delivery of certain quantities of gas at specified prices over a 26-year period. The Company is not currently meeting mini-

mum delivery requirements nor does it presently have sufficient reserves to meet the future minimum deliveries scheduled under the contract. The Company does not expect to incur material losses under this contract.

A Federal Trade Commission Complaint in Docket No. 8934 was issued on July 18, 1973 against the Company and seven other large petroleum companies charging violation of Section 5 of the Federal Trade Commission Act and alleging a combination or agreement to monopolize the business of refining of crude oil. The Complaint seeks no specific relief and the proceeding is in the early stages of development. While management is of the opinion that the proceeding will have no material adverse effect on the net assets of the Company, it is unable at this time to determine what effect, if any, the proceeding will have on future earnings of the Company.

The Attorney General of the State of Florida, on July 9, 1973, filed suit against the Company and 16 other petroleum companies alleging conspiracy and attempts to monopolize in violation of the Sherman Act and Clayton Act. On July 25, 1973, the Attorney General of the State of Connecticut filed suit against the Company and 22 other petroleum companies alleging multiple violations of the Sherman Act, Clayton Act and the Connecticut Antitrust Act. These suits are in the early stages of development, and it is believed that neither suit will have a material adverse effect on the net assets or future earnings of the Company.

Note 14—Commitments

The Company has noncancelable tanker charters and leases for service stations and other facilities including office space, tank cars and automobiles for which total rental expense in 1973 and 1972 was \$93 and \$103 million after being reduced by related rental income of \$60 and \$50 million, respectively. Future minimum rentals payable under these leases are as follows:

Millions of Dollars					
	Tanker Charters	Marketing Properties	Other	Less Rental Income	Net Rentals
1974	\$ 87	\$ 24	\$ 37	\$30	\$118
1975	50	22	29	2	99
1976	31	17	25	2	71
1977	24	15	21	1	59
1978	21	13	19	1	52
1979-1983	37	35	72	5	139
1984-1988	4	14	51	4	65
1989-1993	—	4	38	3	39
After 1993	—	3	20	—	23
	<u>\$254</u>	<u>\$147</u>	<u>\$312</u>	<u>\$48</u>	<u>\$665</u>

During 1973, the SEC adopted certain disclosure requirements relating to those noncapitalized leases, included above, which they considered financial in nature. Such leases do not meet the SEC disclosure requirements as they are immaterial.

The Company has outstanding commitments of approximately \$400 million from 1974 through 1977 for the construction of tankers. In addition, the Company has other commitments in the ordinary course of business for the acquisition or construction of properties and for the purchase of materials, supplies and services, which commitments are not considered significant in relation to the net assets of the Company.

The Company is also obligated to certain companies in which it has equity interests to provide specified minimum revenues from crude or product shipments or by other means. It is anticipated that shipments or other operating factors will be at levels sufficient to provide the revenues required.

Note 15—Minority Interests

Minority interests reflect the ownership of minority shareholders in the equity of consolidated subsidiaries which are less than wholly-owned, primarily Gulf Oil Canada Limited, and were comprised of the following:

Millions of Dollars		
December 31		
	1973	1972
Capital stock	\$ 94	\$ 93
Retained earnings	170	145
Other	2	9
	<u>\$266</u>	<u>\$247</u>

Note 16—West Texas Leases

In 1973, the Supreme Court of Texas ruled adversely to the Company's position with respect to one of its term leases in West Texas. As a result of this decision, the bulk of these leases will expire on various dates in 1975, and the mineral rights will revert to the owners thereof at such time. The Company owns producing equipment which under the terms of the leases it has the right to remove, and also owns substantial water rights which have been an important factor in the secondary recovery operations on these properties. The Company has obtained amendments extending some of these leases and also has acquired the rights of various mineral owners with respect to certain other leases. The Company is continuing its efforts to obtain amendments to the other leases and to acquire further mineral interests.

Management is of the opinion that the expiration of the remaining leases will have no material adverse effect on the net assets of the Company. The leases for which the Company has not secured extensions or acquired the rights of the mineral owners had income of approximately \$40 million in 1973 before considering related tax effect. However the production and income on these leases have been declining.

Note 17—Foreign Currency Adjustments

An analysis of the net foreign currency exchange adjustments included in income follows:

Millions of Dollars		
	Gain (Loss)	
	1973	1972
Long-term debt	\$(4)	\$(43)
Working capital	(7)	18
Tax effect	12	14
	<u>\$ 1</u>	<u>\$(11)</u>

Included in the net adjustments were unrealized losses of \$13 and \$42 million before tax effects in 1973 and 1972, respectively.

Note 18—Tender Offer

On March 16, 1973, the Company purchased 13,005,536 shares of its outstanding Capital Stock at a total cost of \$341 million under a public tender to shareholders. The purchase was made with available working capital and did not require any outside financing.

Note 19—Participation Negotiations With Governments of Foreign Oil Producing Countries

The Participation Agreement which was signed early in January, 1973 by the Government of Kuwait, Gulf and its partner British Petroleum Company was not ratified by the Kuwait National Assembly after many months of debate. Consequently, it was necessary for the companies to negotiate a new Participation Agreement that was more appropriate to the circumstances existing in Kuwait. On January 29, 1974 a new agreement was signed by the Government and the companies and was submitted to the Assembly for consideration early in February. The new agreement, if enacted into law, provides for the Government to own a 60% interest in all assets and operations of the companies in Kuwait as of January 1, 1974. Sixty percent of the Company's production from Kuwait amounted to 831,600 and 941,400 daily average barrels in 1973 and 1972, respectively. These amounts represented approximately 27% and 30% of the Company's total worldwide crude oil production in those years.

Consideration for this sale was negotiated at \$112 million of which the Company's share is \$56 million receivable within two weeks of ratification. The Government will own its equity share of the hydrocarbons produced and will pay its percentage share of all operating costs and capital requirements. While the agreement does not directly provide for the purchase of the Government's share of crude oil, it does provide for the Company's right to purchase that portion of the Government's production in excess of its internal and marketing requirements at commercial prices and terms agreeable to both parties.

Under the terms of the agreement a new operating company will be incorporated in Kuwait to operate all joint facilities and will be owned 60% by the Government and 20% each by the companies. A joint management committee with voting rights equal to ownership interest will provide for minority interest protection through a 75% majority being required to carry major decisions. Prior to the end of 1979, the parties will review the terms of the agreement to determine if any changes in relationships should be made.

The companies will pay the Government for the year 1973 an amount equal to the benefit that Kuwait would have received if there had been applied in Kuwait participation arrangements based on those generally applicable in several neighboring Arab countries in respect of that year.

In Iran, where Gulf owns 7% of the Iranian Consortium a new agreement covering the Consortium was signed with the Iranian Government which became effective March 21, 1973. This agreement replaced the 1954 Government agreement. It provides for a new arrangement whereby the Consortium initially operates the concession as a service contractor and has rights to export the majority of the oil over a twenty-year period. The Iranian Government is to receive financial benefits under the new arrangement that are equivalent to that received by other Gulf states who have implemented the General Agreement on Participation.

In Nigeria, negotiations on the participation issue continued throughout most of 1973 but have not been concluded.

In Ecuador, Gulf and its partner were required to renegotiate their existing concessions contracts. This was concluded in August, 1973. Among other changes, the new agreement provided that the companies would negotiate with the Ecuadorian Government for its acquisition of a 25% participating interest in 1977. Subsequent to that agreement, the Government issued a decree stating that the Minister of Natural and Energic Resources is authorized to begin negotiations with the companies in order to make effective within 1974 the Government's option to participate in 25% of the concession rights.

In Venezuela, the Government has indicated that it will seek a revision of the Company's concession rights prior to their expiration dates. Most of the Company's concession rights expire in 1984.

In Cabinda, the Government and the Company have commenced discussions regarding participation by the Government in the existing concession.

The Company has made provision in the financial statements for the estimated 1973 effect of participation and management believes that no material adverse effect on the net assets of the Company will result. Because of the inability to predict the future availability and cost of crude oil, management is unable to determine at this time the possible effect of these negotiations on future earnings.

Note 20—Stock Options

On September 17, 1968, the shareholders approved the 1968 Stock Option Plan which replaced the 1951 Stock Option Plan. Under the 1968 Plan, 1,000,000 unissued shares of Capital Stock of the Company were reserved for sale to officers and employees of the Company, as provided in the Plan. In addition to shares reserved under the 1968 Plan, unissued shares are reserved for unexercised options granted under the 1951 Plan. At December 31, 1973, 1,361,324 shares were reserved for officers and employees of the Company and its subsidiaries of which 1,304,074 shares were subject to options granted to certain officers and employees. At December 31, 1972, 1,427,649 shares were reserved for officers and employees of the Company and its subsidiaries of which 1,256,299 shares were subject to options granted to certain officers and employees. At December 31, 1973 and 1972 there were 57,250 and 171,350 unoptioned shares, respectively, available for the granting of options.

All options granted prior to January 1, 1969 were granted under the 1951 Plan. Each option agreement, under the 1951 Plan, provides, among other things, that the option may be exercised in whole or in part within the period beginning one year from the option date and ending either ten years from the option date or on the expiration of three months beyond the optionee's termination of employment, death or attainment of age 65, whichever is earliest. In consideration for the option, each optionee agrees to remain in the employment of the Company or any of its subsidiary companies for at least one year from the option date.

All options granted subsequent to December 31, 1968 were granted under the 1968 Plan. The 1969 and 1970 stock option agreements provided, among other things, that the options may be exercised in whole or in part within the period beginning one year from the option date and ending five years from the option date or on the expiration of three months beyond the optionee's termination of employment (except in the case of death) or attain-

ment of age 65, whichever is earliest. In the case of death, the option may be exercised prior to the expiration date of the option or within one year after the date of death, whichever is the shorter period. Stock options granted on January 2, 1973 and in 1972 and 1971 were qualified and non-qualified options covering the same shares. Stock options granted in April 1973 were qualified and non-qualified options covering separate shares. In consideration for the option, each optionee agrees to remain in the employment of the Company or any of its subsidiary companies for at least one year from the option date.

The qualified options granted under the 1968 Plan are exercisable in whole or in part within the period beginning one year from the option date and ending five years from the option date or on the expiration of two months beyond the optionee's termination of employment (except in the case of death) or attainment of age 65, whichever is earliest. In the case of death, the option may be exercised prior to the expiration date of the option or within eleven months after the date of death, whichever is the shorter period.

The non-qualified options granted under the 1968 Plan are exercisable only to the extent that the shares subject to the qualified stock options remain unexercised on the expiration date of the qualified stock options covering the same shares. However, all shares covered by qualified stock options shall not be exercisable while there is outstanding any qualified stock options previously granted to the optionee at a higher price. Subject to these restrictions the non-qualified options are exercisable in whole or in part within the period beginning one year from the option date and ending ten years from the option date or on the expiration of three months beyond the optionee's termination of employment (except in the case of death) or attainment of age 65, whichever is earliest. In the case of death, the option may be exercised prior to the expiration date of the option or within one year after the date of death, whichever is the shorter period.

With respect to options granted under both the 1951 Plan and the 1968 Plan, adjustments are made in the number of shares and the option price per share in the event of declaration of a stock dividend, stock split or occurrence of certain other events affecting the Company's capitalization. The prices per share are equal to the fair market value per share of Capital Stock of the Company at the dates the options were granted, under both Plans.

Note 20—Stock Options (Continued)

Shares of the Company under option were as follows:

Year option granted	Option price per share	December 31, 1973		December 31, 1972	
		Number of shares unissued	Total option price	Number of shares unissued	Total option price
1963	\$21.16	—	\$ —	2,000	\$ 42,313
1965	28.00	48,383	1,354,724	60,583	1,696,324
1966	25.97	56,987	1,479,881	74,362	1,931,088
1967	32.63	114,504	3,735,693	138,854	4,530,112
1968	36.66	145,800	5,344,481	156,000	5,718,375
1969	42.94	134,300	5,766,506	148,200	6,363,337
1970	25.25	242,250	6,116,813	266,050	6,717,762
1971(1)	29.38	158,550	4,657,406	169,750	4,986,406
1972(2)	26.71	228,300	6,097,231	240,500	6,424,344
1973(3)	26.96	175,000	4,718,125	—	—
		<u>1,304,074</u>	<u>\$39,270,860</u>	<u>1,256,299</u>	<u>\$38,410,061</u>

(1) These options became exercisable on January 28, 1972. The fair market value at date exercisable was \$4,716,756, an average of \$26.94 a share.

(2) These options became exercisable as follows: 217,300 shares on January 27, 1973; 11,000 shares on June 27, 1973. The fair market value at date exercisable was \$6,387,350, an average of \$26.80 per share. Option price shown is average per share.

(3) These options are exercisable as follows: 170,000 shares on or after January 2, 1974; 5,000 shares on or after April 24, 1974. Option price shown is average per share.

During 1973 and 1972 shares were purchased by option holders as follows:

Year options were		Number of shares	Total option price(1)	Fair value on dates options were exercised(2)	
Exercised	Granted			Average per share	Total
1972	1962-1970	8,175	\$189,729	\$27.01	\$220,814
1973(3)	1963-1970	4,200	99,301	27.27	114,551

(1) Option prices per share ranged from \$19.97 to \$42.94 during the period covered.

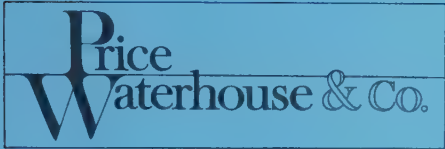
(2) Average market values per share were used in computing the fair value on the dates options were exercised.

(3) Detail of shares purchased by option holders during the year ended December 31, 1973, all of which were purchased prior to March 31, 1973, follows:

Year option granted	Number of shares	Total option price	Fair value on dates exercised
1963	2,000	\$42,313	\$ 52,738
1966	2,000	51,938	56,625
1970	200	5,050	5,188
	<u>4,200</u>	<u>\$99,301</u>	<u>\$114,551</u>

Proceeds from options exercised are credited to capital accounts; no amounts were charged to income in connection with the exercise of such options.

Report of Independent Accountants



TWO GATEWAY CENTER, PITTSBURGH, PENNSYLVANIA 15222

February 22, 1974

To the Shareholders and Board of
Directors of Gulf Oil Corporation

In our opinion, based on our examinations and the report mentioned below of other independent accountants, the accompanying statement of financial position, the related statements of income and retained earnings and changes in financial position and the supplemental schedules on pages 28 and 29 present fairly the consolidated financial position of Gulf Oil Corporation and its subsidiaries at December 31, 1973 and 1972, the results of their operations and the changes in financial position for the years then ended, in conformity with generally accepted accounting principles consistently applied. Our examinations of these statements and supplemental

schedules were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We did not examine the consolidated financial statements of Gulf Oil Canada Limited and its subsidiaries which constitute no more than 14% of total revenues in each of the two years ended December 31, 1973 and 14% of total assets at December 31, 1973 and December 31, 1972. Our opinion, insofar as it relates to the amounts included for these companies, is based solely upon the report of other independent accountants.

Price Waterhouse & Co.

Five-Year Financial Summary

	1973	1972	1971	1970	1969
Dollar Amounts in Millions					
STATEMENT OF INCOME					
Revenues					
Sales and other operating revenues (includes consumer excise taxes)					
United States	\$ 4,626	\$ 3,944	\$ 3,841	\$ 3,881	\$ 3,703
Foreign	5,217	3,680	3,364	2,716	2,407
	<u>9,843</u>	<u>7,624</u>	<u>7,205</u>	<u>6,597</u>	<u>6,110</u>
Dividends, interest, equity earnings and other revenues	164	109	167	123	128
	<u>10,007</u>	<u>7,733</u>	<u>7,372</u>	<u>6,720</u>	<u>6,238</u>
Deductions					
Purchased crude oil, products and merchandise	2,833	1,763	1,651	1,656	1,431
Operating expenses	1,618	1,447	1,330	1,182	1,089
Selling, general and administrative expenses	944	921	935	810	796
Consumer excise taxes	1,426	1,381	1,265	1,201	1,156
Sales, use, ad valorem and other taxes	265	228	211	203	175
Income taxes					
United States	23	12	31	12	4
Foreign	1,341	800	724	423	372
Deferred	12	11	17	49	66
Depreciation, depletion, amortization and retirements	610	576	510	522	451
Interest on long-term debt	135	147	137	112	87
	<u>9,207</u>	<u>7,286</u>	<u>6,811</u>	<u>6,170</u>	<u>5,627</u>
Income before extraordinary item	800	447	561	550	611
Extraordinary item	—	(250)	—	—	—
Net income	<u>\$ 800</u>	<u>\$ 197</u>	<u>\$ 561</u>	<u>\$ 550</u>	<u>\$ 611</u>
Estimated losses from discontinued operations charged to net income					
Net (loss)	\$ —	\$ (27)	\$ (32)	\$ (26)	\$ (19)
Per share	\$ —	\$ (.13)	\$ (.15)	\$ (.12)	\$ (.09)
Per share data					
Income before extraordinary item	\$ 4.06	\$ 2.15	\$ 2.70	\$ 2.65	\$ 2.94
Extraordinary item	—	(1.20)	—	—	—
Net income	<u>\$ 4.06</u>	<u>\$.95</u>	<u>\$ 2.70</u>	<u>\$ 2.65</u>	<u>\$ 2.94</u>
Cash dividends	\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50
Shareholders' equity	<u>\$ 28.61</u>	<u>\$ 26.04</u>	<u>\$ 26.59</u>	<u>\$ 25.42</u>	<u>\$ 24.28</u>
Geographical sources of income (loss) before extraordinary item by line of business					
United States					
Petroleum					
Producing, refining and marketing operations	\$ 480	\$ 420	\$ 412	\$ 447	\$ 451
Amortization of non-producing leases and exploration and dry hole expense	(116)	(63)	(35)	(54)	(53)
Chemicals	10	(3)	(14)	(14)	13
Nuclear	(132)	(31)	(8)	(16)	(1)
Minerals	(6)	(3)	(13)	(4)	(4)
Other	(10)	1	(1)	—	1
	<u>226</u>	<u>321</u>	<u>341</u>	<u>359*</u>	<u>407*</u>
Foreign					
Petroleum					
Producing, refining and marketing operations	659	238	331	267	278
Amortization of non-producing leases and exploration and dry hole expense	(99)	(88)	(78)	(66)	(73)
Chemicals	17	(22)	(31)	(10)	(1)
Nuclear	(1)	—	—	—	—
Minerals	(2)	(2)	(2)	—	—
	<u>574</u>	<u>126</u>	<u>220</u>	<u>191*</u>	<u>204*</u>
	<u>\$ 800</u>	<u>\$ 447</u>	<u>\$ 561</u>	<u>\$ 550</u>	<u>\$ 611</u>
Financial condition at year end					
Working capital	\$ 1,514	\$ 1,444	\$ 1,268	\$ 1,173	\$ 1,089
Long-term debt	\$ 1,608	\$ 1,941	\$ 2,100	\$ 1,695	\$ 1,448
Employed capital (total assets less current liabilities)	\$ 7,670	\$ 7,832	\$ 8,082	\$ 7,397	\$ 6,868
Shareholders' equity	\$ 5,569	\$ 5,409	\$ 5,521	\$ 5,278	\$ 5,040
Percent return before extraordinary item on average					
Employed capital	11.7%	6.8%	8.4%	8.7%	10.1%
Shareholders' equity	14.6%	8.2%	10.4%	10.7%	12.5%
Capital expenditures (including business investments)	\$ 823	\$ 718	\$ 983	\$ 958	\$ 1,033
Exploration and dry hole expense	\$ 156	\$ 141	\$ 113	\$ 109	\$ 123
Shareholders at year end	347,731	307,230	248,674	235,937	199,967
Weighted average shares outstanding (in thousands)	197,250	207,666	207,650	207,593	207,677
Wages, salaries and employee benefits	\$ 739	\$ 715	\$ 666	\$ 618	\$ 574
Employees at year end	51,600	57,500	59,300	61,300	60,000

* Restated for comparative purposes.

(A financial and statistical supplement to the 1973 Annual Report is available to shareholders. Copies may be obtained by writing to Herbert C. Manning, Vice President and Secretary, Gulf Oil Corporation, P.O. Box 1166, Pittsburgh, Pennsylvania 15230.)

Five-Year Operating Summary

	1973	1972	1971	1970	1969
Net crude oil and condensate produced (daily average barrels)					
United States	439,700	476,600	508,500	543,900	523,700
Canada	113,400	103,600	88,000	80,300	74,900
Latin America	253,200	206,400	197,200	200,500	205,500
Europe	800	600	—	—	—
Middle East	1,110,100	1,841,900	1,986,400	1,787,200	1,663,900
Africa	508,800	452,500	376,600	316,400	219,500
Purchase under Participation Arrangements	582,700	—	—	—	—
	<u>3,008,700</u>	<u>3,081,600</u>	<u>3,156,700</u>	<u>2,928,300</u>	<u>2,687,500</u>
Equity interest (50% or less)	3,400	4,100	6,300	6,100	6,300
Total	<u>3,012,100</u>	<u>3,085,700</u>	<u>3,163,000</u>	<u>2,934,400</u>	<u>2,693,800</u>
Net natural gas liquids produced (daily average barrels)					
United States	80,100	84,300	83,800	82,100	78,600
Canada	11,500	10,200	12,200	11,900	10,900
Latin America	3,900	3,500	3,700	3,500	3,500
Middle East	32,700	30,000	25,800	24,100	23,500
Total	<u>128,200</u>	<u>128,000</u>	<u>125,500</u>	<u>121,600</u>	<u>116,500</u>
Net natural gas produced (thousand cubic feet per day)					
United States	2,476,600	2,716,200	2,685,200	2,757,000	2,509,500
Canada	434,300	448,500	466,300	394,100	355,000
Latin America	91,000	78,000	77,800	78,900	78,600
Middle East	358,500	329,400	310,000	256,000	245,000
Total	<u>3,360,400</u>	<u>3,572,100</u>	<u>3,539,300</u>	<u>3,486,000</u>	<u>3,188,100</u>
United States imports (daily average barrels)					
Crude	156,000	73,100	55,600	46,500	61,900
Products	76,400	75,100	61,100	71,600	53,500
Crude oil processed (daily average barrels)**					
United States	828,200	767,300	672,800	702,300	687,500
Canada	327,200	297,200	258,100	204,800	197,300
Latin America	118,600	168,300	174,800	197,700	145,400
Europe	359,600	357,300	341,900	317,500	254,700
Middle East	96,800	114,000	154,000	139,900	143,100
Asia	11,400	25,900	29,800	28,500	25,000
	<u>1,741,800</u>	<u>1,730,000</u>	<u>1,631,400</u>	<u>1,590,700</u>	<u>1,453,000</u>
Equity interest (50% or less)	234,300	215,000	161,100	145,000	103,600
Total	<u>1,976,100</u>	<u>1,945,000</u>	<u>1,792,500</u>	<u>1,735,700</u>	<u>1,556,600</u>
Refined products sold (daily average barrels)					
United States	902,100	803,200	774,900	799,600	796,200
Canada	267,700	245,000	218,100	190,900	186,700
Latin America	76,700	86,900	85,800	89,200	74,400
Europe	290,900	294,000	309,500	318,700	250,700
Middle East	75,900	85,600	126,800	124,500	119,800
Asia	7,300	21,000	25,300	22,100	22,400
	<u>1,620,600</u>	<u>1,535,700</u>	<u>1,540,400</u>	<u>1,545,000</u>	<u>1,450,200</u>
Equity interest (50% or less)	160,800	141,000	128,400	117,600	60,000
Total	<u>1,781,400</u>	<u>1,676,700</u>	<u>1,668,800</u>	<u>1,662,600</u>	<u>1,510,200</u>
Coal mined (daily average tons)					
United States	22,100	21,000	19,400	21,500	20,900
Chemicals sold (daily average tons)					
United States	10,900	9,300	8,000	10,800	8,500
Canada	2,600	2,500	2,300	2,100	1,100
Latin America	—	300	400	300	200
Europe	2,100	1,700	1,000	500	300
Asia	300	200	200	200	100
	<u>15,900</u>	<u>14,000</u>	<u>11,900</u>	<u>13,900</u>	<u>10,200</u>
Equity interest (50% or less)	800	1,600	1,400	1,200	1,000
Total	<u>16,700</u>	<u>15,600</u>	<u>13,300</u>	<u>15,100</u>	<u>11,200</u>
Discontinued operations (included above) - (daily average barrels)					
Net crude oil, condensate and natural gas liquids produced	—	23,400*	28,500	26,200	20,200
Crude oil processed	—	70,000*	80,000	56,200	14,600
Refined products sold	—	131,900*	140,600	134,800	99,500

* Represents daily average barrels through September 30, 1972 for operations included in the divestment program (See Extraordinary Item Note 10).

** Includes crude oil processed by the Company for its own account and for others, and by others for the Company's account. Total operating data include 100% of volumes of all consolidated subsidiaries (more than 50% owned) and equity interest in companies owned 50% or less.

Supplemental Schedules

Properties (SEC Schedule V)

Years Ended December 31, 1973 and 1972
Millions of Dollars

Classification	Balance at beginning of period	Additions		Deductions		Balance at close of period
		At cost	Subsidiaries acquired	Retirements or sales	Transfers and reclassi- fications	
1973						
Exploration & Production	\$ 5,106	\$479	\$ —	\$178	\$ 67	\$ 5,340
Marketing	1,836	94	—	122	—	1,808
Refining	1,757	63	—	31	(14)	1,803
Transportation	979	84	—	53	(1)	1,011
Chemicals	615	24	—	24	(1)	616
Natural Gas Liquids	349	17	—	3	—	363
Other	220	23	—	8	53	182
	<u>\$10,862</u>	<u>\$784</u>	<u>\$ —</u>	<u>\$419</u>	<u>\$104**</u>	<u>\$11,123</u>
1972*						
Exploration & Production	\$ 4,874	\$357	\$ —	\$125	\$ —	\$ 5,106
Marketing	2,072	99	12	352	(5)	1,836
Refining	1,890	85	—	217	1	1,757
Transportation	963	73	—	57	—	979
Chemicals	648	19	—	48	4	615
Natural Gas Liquids	332	19	—	2	—	349
Other	256	26	—	62	—	220
	<u>\$11,035</u>	<u>\$678</u>	<u>\$ 12</u>	<u>\$863</u>	<u>\$ —</u>	<u>\$10,862</u>

Accumulated Depreciation, Depletion and Amortization of Properties (SEC Schedule VI)

Years Ended December 31, 1973 and 1972
Millions of Dollars

Classification	Balance at beginning of period	Additions		Deductions		Balance at close of period
		Charged to income	Subsidiaries acquired	Retirements	Transfers and reclassi- fications	
1973						
Exploration & Production	\$ 3,022	\$348	\$ —	\$179	\$ 32	\$ 3,159
Marketing	708	87	—	75	—	720
Refining	840	63	—	29	8	866
Transportation	380	43	—	41	(1)	383
Chemicals	225	41	—	16	—	250
Natural Gas Liquids	181	16	—	—	—	197
Other	88	12	—	7	13	80
	<u>\$ 5,444</u>	<u>\$610</u>	<u>\$ —</u>	<u>\$347</u>	<u>\$ 52**</u>	<u>\$ 5,655</u>
1972*						
Exploration & Production	\$ 2,837	\$288	\$ —	\$103	\$ —	\$ 3,022
Marketing	743	111	4	150	—	708
Refining	815	66	—	41	—	840
Transportation	365	40	—	25	—	380
Chemicals	230	40	—	45	—	225
Natural Gas Liquids	167	15	—	1	—	181
Other	85	16	—	13	—	88
	<u>\$ 5,242</u>	<u>\$576</u>	<u>\$ 4</u>	<u>\$378</u>	<u>\$ —</u>	<u>\$ 5,444</u>

* Reclassified for comparative purposes.

** Principally transfers to investments and long-term receivables.

Guarantees of Securities of Other Issuers (SEC Schedule XI)

December 31, 1973

Name of issuer of securities guaranteed by persons for which statement is filed	Title of issue of each class of securities guaranteed	Total amount guaranteed and outstanding Millions of Dollars
Associated Companies		
Esso Standard S.A.F.	Discounted Drafts	\$ 18
Okinawa Sekiyu Seisei Co.	Loans	40
Okinawa Terminal Co.	Loans	18
Raffinerie de Cressier S.A.	Loans	6
Refineria de Petroleos del Norte S.A.	Various	17
Others	Various	1
		<u>100</u>
Others		
Ameripol, Inc.	Loans	10
Compania Yacibol Bogoc Transportadores	Loans	12
Holiday Inns, Inc.	Loans	5
Service Station Owners	Loans	21
Others, none of which exceeds \$5 million	Various	23
		<u>71</u>
Total		<u>\$171</u>

Guarantees are generally for principal and interest with estimated aggregate annual interest of approximately \$11 million.

Supplementary Income Statement Information (SEC Schedule XVI)

Years Ended December 31, 1973 and 1972

	Charged to Costs and Expenses Millions of Dollars	
	1973	1972
Maintenance and Repairs	<u>\$ 260</u>	<u>\$ 256</u>
Rents	<u>\$ 264</u>	<u>\$ 293</u>
Taxes Other Than Income Taxes		
Consumer excise	<u>\$1,426</u>	<u>\$1,381</u>
Ad valorem	<u>103</u>	<u>99</u>
Sales and use	<u>74</u>	<u>53</u>
Other	<u>88</u>	<u>76</u>
	<u>\$1,691</u>	<u>\$1,609</u>

BOARD OF DIRECTORS

B. R. Dorsey
Chairman
Charles M. Beeghly*
E. D. Brockett*
R. Hal Dean*
James H. Higgins*
James E. Lee
Beverley Matthews
Nathan W. Pearson
Edwin Singer*
James M. Walton*

PRINCIPAL CORPORATE OFFICERS

B. R. Dorsey
*Chairman of the Board and
Chief Executive Officer*
James E. Lee
President
Z. D. Bonner
Executive Vice President
H. H. Hammer
Executive Vice President
W. L. Henry
Executive Vice President
Z. Q. Johnson
Executive Vice President
Edward B. Walker
Executive Vice President
Merle E. Minks
General Counsel
Herbert C. Manning
Vice President and Secretary
Fred Deering
*Vice President
Finance
and Acting Comptroller*
Paul H. Weyrauch
Treasurer

OTHER CORPORATE OFFICERS AND OFFICIALS

R. A. Anderson
*Vice President
Executive Special Studies*
W. B. Billock
*Vice President
Industrial Relations*
P. B. Binsted
*Vice President
Area Representative
Athens*
W. C. Brodhead
*Vice President
Philadelphia*
F. D. Gassaway, M.D.
*Vice President
and Medical Director*
H. E. Hansen
*Vice President
Government Agreements*
M. J. Hill
*Vice President
Exploration and Production*
P. E. Holloway
*Vice President
Corporate Planning and
Economics*
K. S. Manning
*Vice President
Employee Relations*
J. H. Morris
*Vice President
Financial Relations*
W. P. Moyles
*Vice President
Corporate Development*
Paul Sheldon
*Vice President
Advertising and Public Relations*
G. K. Thompson
*Vice President
Executive Representative
New York*
R. M. Schaper
*Director
Purchasing*
Robert Scott
*Director
Computation and
Communication Services*
F. W. Standefer
*Director
Taxes*
A. Lewis, Jr.
*President
Gulf Oil Corporation
Foundation*

* Members of the Audit Committee

PRINCIPAL DIVISIONS AND SUBSIDIARY COMPANIES

GULF OIL COMPANY—U.S. *Houston, Texas*

Z. D. Bonner
*President and
Chief Executive Officer*

F. S. Schwend
Chairman
Eugene Hosford
Executive Vice President

GULF OIL COMPANY— EASTERN HEMISPHERE *London, England*

M. R. J. Wyllie
President

M. L. Ralston
Executive Vice President

GULF OIL COMPANY— LATIN AMERICA *Coral Gables, Florida*

T. D. Lumpkin
President

GULF OIL COMPANY—ASIA *Pittsburgh, Pennsylvania*

W. W. Finley, Jr.
President
J. H. McDonald
Executive Vice President

GULF OIL TRADING COMPANY *Pittsburgh, Pennsylvania*

Herbert I. Goodman
President
W. H. Blackledge, Jr.
Executive Vice President
L. H. Bonin, Jr.
Executive Vice President

GULF OIL CANADA LIMITED *Toronto, Canada*

Jerry McAfee
*President and
Chief Executive Officer*
C. D. Shepard
Chairman of the Board

GULF GLOBAL EXPLORATION COMPANY *Pittsburgh, Pennsylvania*

M. J. Hill
President

GULF ENERGY AND MINERALS COMPANY *Pittsburgh, Pennsylvania*

R. W. Baldwin
President
S. A. Zagnoli
Executive Vice President
Denver, Colorado

GULF OIL CHEMICALS COMPANY *Pittsburgh, Pennsylvania*

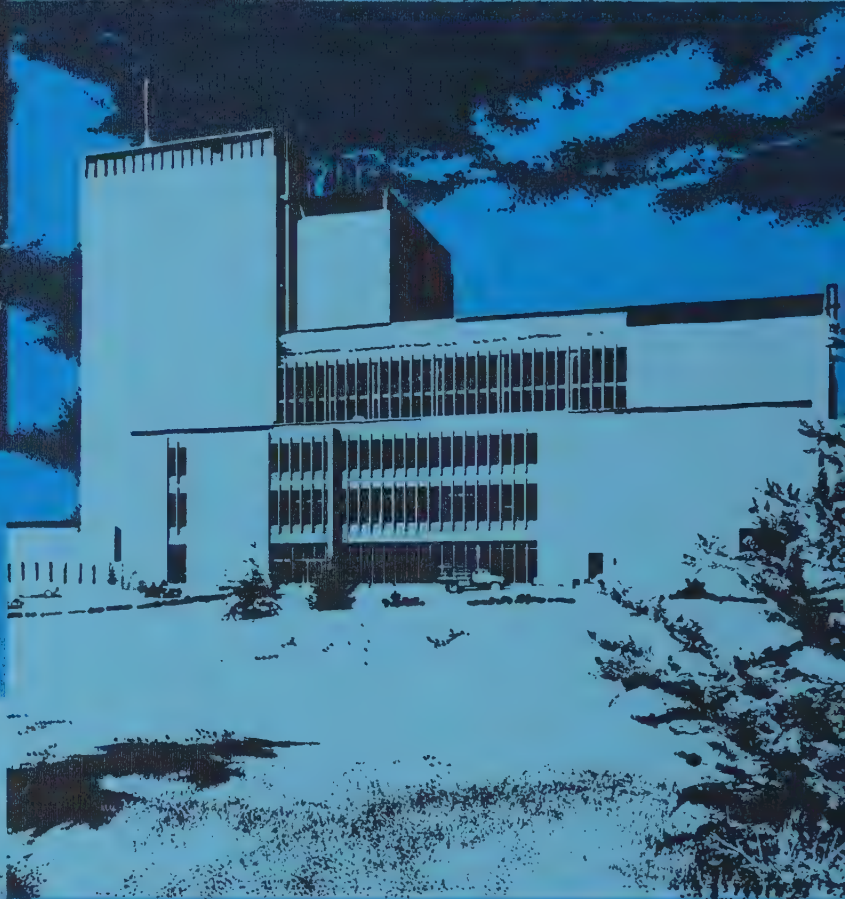
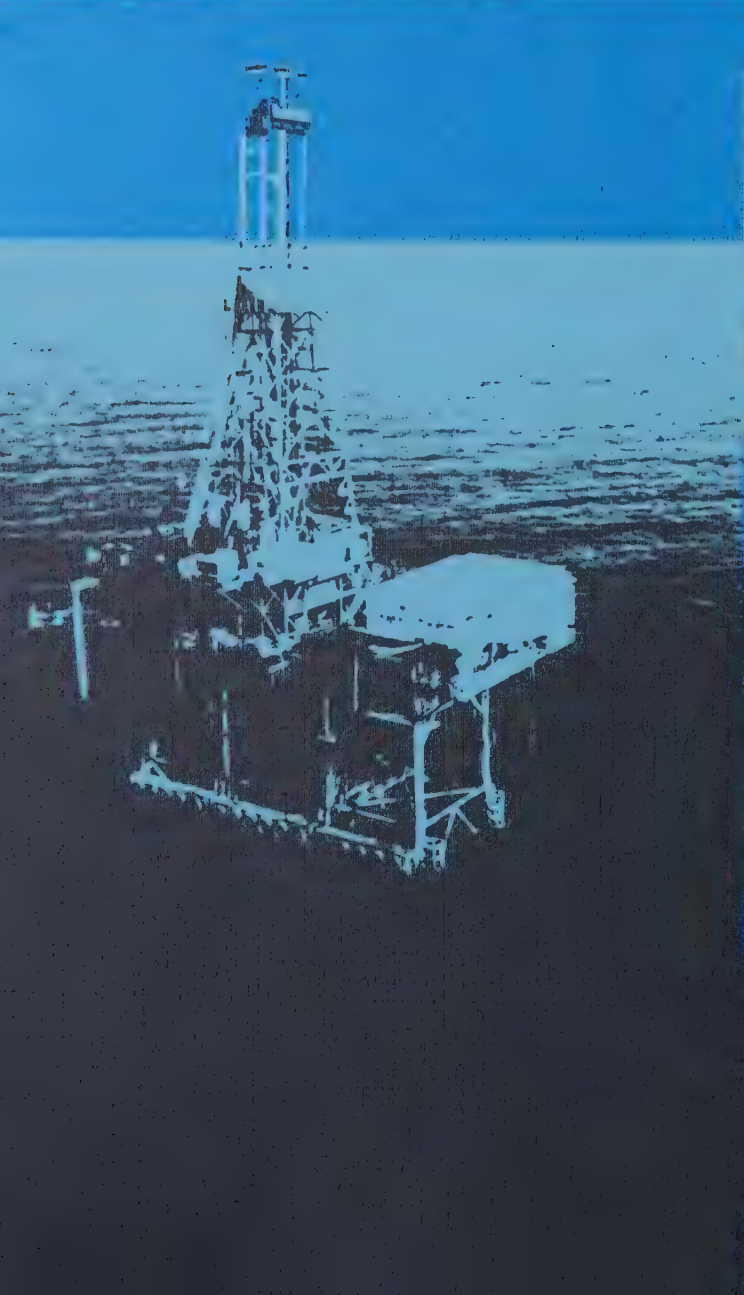
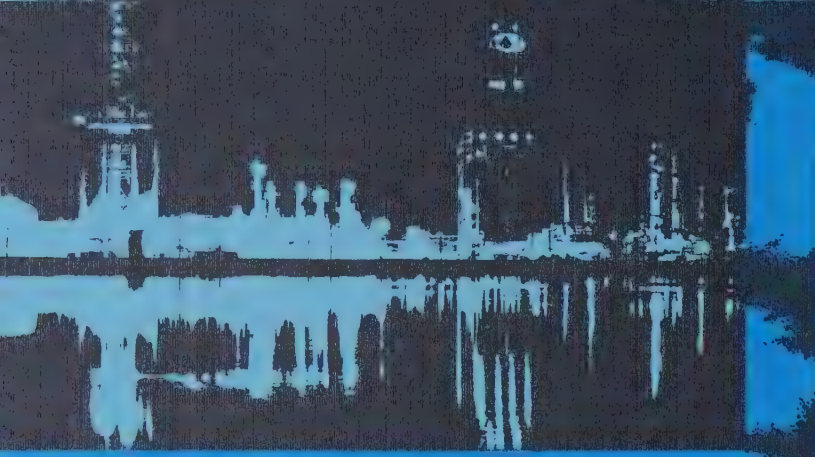
W. C. Roher
President

GULF RESEARCH & DEVELOPMENT COMPANY *Harmarville, Pennsylvania*

T. R. Hopkins
President

GULF OIL REAL ESTATE DEVELOPMENT COMPANY *Reston, Virginia*

W. H. Magness
President



1973 PROFITS IMPROVED, BUT NOT EXCESSIVE

The nation's consumers have been stunned by the rising gasoline and fuel oil prices and the inconvenience of more serious gasoline shortages. This, understandably, has led to their anger and frustration. It comes as no surprise, therefore, that reports of record profits by oil companies have helped direct this anger to the industry. Widespread use of the words "excessive" and "windfall," coined to describe these record profits are resulting in political reactions that can be destructive to the long-range economic health of our nation. Legislation proposed to somehow eliminate these "excess" and "windfall" profits by changing the tax laws is gathering the momentum of an avalanche.

The management of Gulf and our oil industry competitors are trying to inject reason into this emotionally charged political atmosphere by explaining that our profits are neither excessive nor are they sufficient to pay the tremendous costs of developing the new energy resources our nation needs. Unfortunately, the noise level of political attacks against the oil industry tends to drown out any voices of reason. Too few really understand the meaning of "profit," much less "return on investment."

A leading U. S. Senator has stated that he supports three economic approaches which, taken together, are quite incompatible. He feels: 1. Oil companies should earn a return on investment that is competitive with business in general in order to be able to attract the necessary investment capital; 2. Oil companies must reduce the price of gasoline and fuel oil; 3. Oil company profits must be taxed more. Shareholders know, however, that if a company is to maintain a competitive return on investment, either prices must rise enough to offset the higher taxes or taxes must be reduced to offset the loss of reve-

nue from lower prices. It is impossible to reduce prices, raise taxes, and still maintain the same return on investment. It's that simple. Gulf's profit for 1973 represents an 11.7 percent return on employed capital. This is only marginally higher than the 11.4 percent return the Corporation achieved in 1967, Gulf's best previous return. During the interim, however, additional investments to operate the business increased substantially, but the return as a percentage of employed capital continued to drop. (Figure 1.)

In normal times, Gulf's 1973 earnings improvement would have been viewed as reflecting the general improvement in the overall U. S. economy, and representative of the initial benefits from numerous corporate programs initiated over the last several years to increase corporate efficiency and to divest marginal or unprofitable operations. However, these are not normal times in the energy business. Rather, Gulf is faced with two major challenges: We must provide adequate energy supplies to the nation and we must provide insight and understanding to consumers on the facts of the oil business and on what it takes to develop these adequate energy supplies.

ANALYSIS OF GULF PROFITS

Gulf's 1973 earnings represent a profit of 8 cents per dollar on gross revenues of \$10 billion. Translated into profit realized from the sale of crude oil and products, Gulf earned about 1.5 cents per gallon on its worldwide operations last year.

On the basis of a more commonly used earnings evaluation, our 1973 profits amounted to \$4.06 per share, an increase from \$2.15 per share in 1972, on a record low return of 6.8 percent on employed capital.

Excluding the excise taxes collected

from consumers, Gulf paid \$1.641 billion in U. S. and foreign taxes in 1973; \$1.051 billion in 1972.

The earnings from Gulf's U. S. petroleum operations, before considering amortization of non-producing leases and exploration and dry hole expenses, increased 14 percent over 1972. This was due to increased prices for crude oil produced and to a 12.3 percent increase in refined product sales volume. Product price increases received by the Corporation reflected the recovery of increased costs as approved by the Cost of Living Council. By far the greatest increase in earnings was realized overseas. This was caused by increased product prices in all of our overseas markets and by European sales volumes which were six percent higher than anticipated. On a dollar basis, domestic petroleum operations earned approximately \$480 million and foreign petroleum activities earned \$659 million, before considering amortization of non-producing leases and exploration and dry hole expenses which amounted to \$116 million in the domestic operations and \$99 million in foreign operations. Subtracted from these net earnings were aggregate losses of \$124 million, resulting principally from nuclear activities.

HIGHER PROFITS ARE NEEDED

The Chase-Manhattan Bank has estimated that energy companies would have to generate \$1.35 trillion between 1970 and 1985 to meet the world's energy needs. The estimate breaks down the capital requirements as: \$650 billion generated from corporate profits; \$700 billion acquired through capital recovery and borrowing. The assessment states that if these profits are to be realized the industry will have to achieve an average annual growth in net earnings of 18 percent.

Chase-Manhattan views current profits this way: "Clearly, in terms of the world's current and future needs for petroleum, the industry's earnings positively are not excessive—on the contrary, they are still subnormal. And unless they can be improved in the years ahead, the world is faced with the prospect of a devastating shortage of petroleum."

Obviously, both Gulf and the oil industry must strive for higher profits and a higher return on invested capital. Only through such means can we generate the unprecedented amounts of capital which will have to be spent to develop the neces-

sary energy resources. Since 1967, Gulf has invested \$6 billion in anticipation of tight U. S. energy supplies during this decade. Our \$2 billion capital program for 1974 is a continuing step in this effort. Seventy-five percent of this year's budget—almost \$1.5 billion—is allocated for projects to develop new supplies of energy. More than \$870 million is targeted for energy resource acquisition and development in North America. In the United States alone, we have budgeted \$580 million for oil and gas exploration and production. We have also increased the funds allocated for development of coal, uranium

and shale resources in North America.

CAPITAL EXPENDITURES

Profits are of critical importance to both the Corporation and the nation since they provide the means for generating the capital which must be used to find and provide additional sources of energy. Profits serve three basic functions: Alone, they represent funds for reinvestment into the business; they make it possible for a company to acquire additional long-term debt; and they make it possible to acquire capital through the sale of stock. In order to obtain a reasonable price for its stock, the Corporation must issue dividends on a consistent basis. Gulf's history of capital expenditures in relation to profits is represented in Figure 2. You will note that these capital expenditures tend to fluctuate in close relationship to the fluctuations in profit. Also, in any given year since 1967 these expenditures have exceeded profits by a significant amount.

The search for petroleum is a high-risk business and this risk factor has a direct relationship on the source of capital. In the wildcat search for new oil, the odds are 9 to 1 that the well will prove to be a dry hole, and about 60 to 1 against finding oil or gas in commercially significant quantities. This risk factor inhibits the availability of external capital because many investors are reluctant to accept such poor odds. Incentive for investment, then, must come from assured dividends, which are a function of corporate profits. External funding for capital expenditures becomes an even larger question when an oil company's return on investment does not compare favorably with that of other corporations or industries. The January 1, 1974, issue of *Forbes Magazine* published information on the then most recent 12-month earnings of 851 companies. There were

FIGURE 1

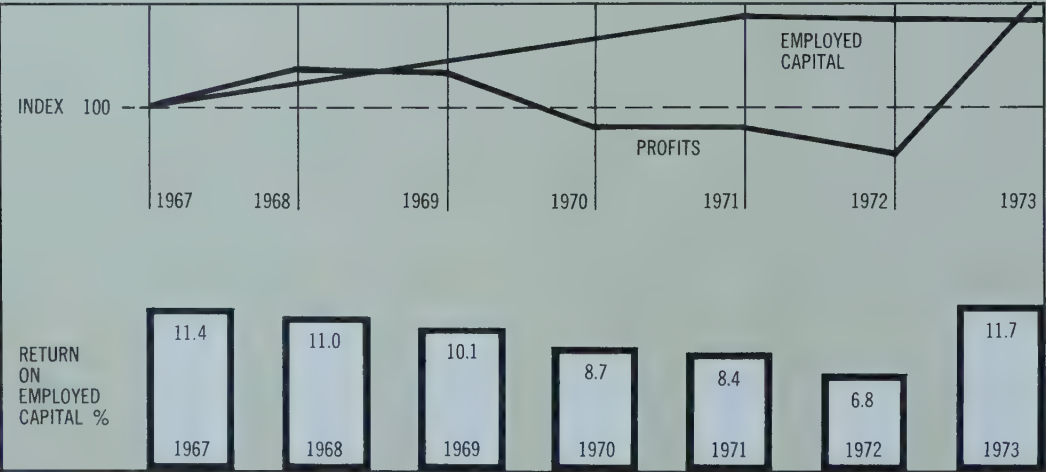
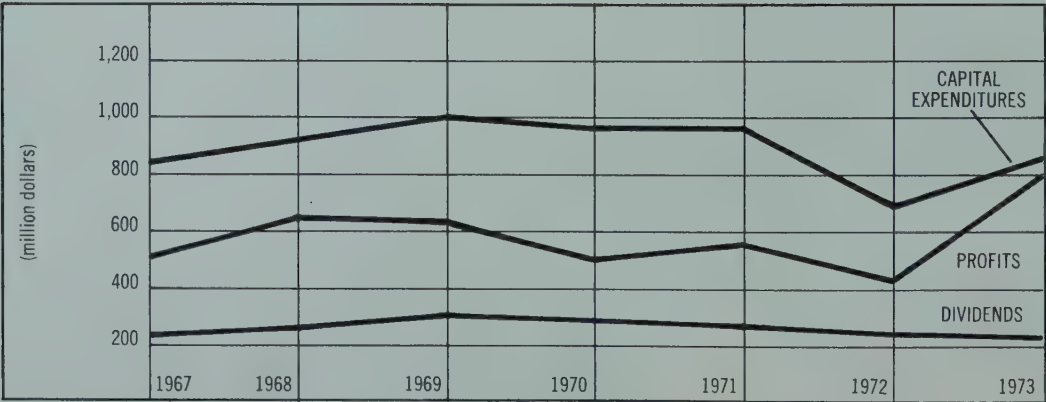


FIGURE 2



212 companies which had a return on invested capital higher than that for Gulf.

COMPARISON OF PROFITS

In the first nine months of 1973, oil industry profits had increased 47 percent over the comparable period in 1972. The First National City Bank of New York reported that the average increase from all manufacturing for the same nine months of 1973 was 35 percent. Iron and steel had increased 89 percent. Nonferrous metals increased 75 percent. Paper and paper products up 60 percent. And even the media was having a fairly good year. *Washington Post* nine-month profits were up 57 percent. *The New York Times* had a fantastic earnings increase of 93 percent. ABC was up 45 percent. All three of these companies had a return on investment comparable to or greater than that of Gulf. It is likely that even they will agree that such increases in profitability are by no means a justification for or even a rationalization of the imposition of excess profit taxes.

TAXATION AND PROFITS

There are many who attribute the industry's alleged "excess" profits to the so-called tax loopholes which the industry is thought to enjoy. In reality, the oil industry's tax structure is much maligned and little understood. The principal components are a foreign tax credit, the depletion allowance, royalties, and the expense of intangible drilling costs.

First, let's see how the foreign tax credit really operates. The United States, unlike a number of other countries, imposes a tax on the income of U. S. companies and citizens whether the income is earned in the United States or abroad. The foreign government, with its sovereign right, may also

impose an income tax. To prevent double taxation, the United States and most other countries allow the foreign taxes paid to be credited against the U. S. tax which normally would be levied. To the extent that the foreign taxes exceed the U. S. taxes, however, the excess foreign taxes cannot be used as credits against U. S. taxes.

As an example, in 1972 Gulf paid income taxes to Kuwait of \$356 million. Our U. S. tax on that same income, would have been \$171 million. The reason for this is that the foreign tax rate was substantially greater than the U. S. tax rate on that income.

The excess foreign taxes cannot be used to reduce Gulf's U. S. taxes. Consequently, the unused foreign taxes were an additional cost to Gulf. One point, frequently misunderstood, is that the foreign tax credit has no effect at all on income earned in the United States; it applies only to foreign income.

The depletion allowance provides a tax deduction related to the value of the oil actually produced. There have been proposals and suggestions that the oil companies be required to reinvest the depletion allowance they get in new refineries and other oil-producing activities. The implication is that the industry is not reinvesting sums equivalent to its depletion allowance. That is not the case with Gulf. In the five-year period, 1968 through 1972, Gulf's total U. S. depletion allowance was less than 40 percent of its U. S. capital expenditures in energy facilities.

The foreign oil-producing countries have a royalty system very similar to that of the United States. They require that the oil companies pay a royalty on the petroleum produced. This royalty payment is not credited against U. S. taxes, as is often charged. It is an expense item and is a

deduction as a cost of operation.

Intangible drilling costs are certain costs related to drilling to find oil and gas which, in themselves, have no salvage. The tax laws provide that these costs may be expensed in the year in which they are incurred rather than being capitalized and written off over a longer period of time. In effect, this provision enables an operator to accelerate the recovery of these drilling expenses as an incentive to encourage further exploration and drilling. Both the depletion allowance and the expensing of intangible drilling costs are most important to the independent producer, who must depend on attracting outside investment sources for his capital. These investment sources would dry up if the tax provisions were reduced.

SUMMARY

The belief that petroleum industry profits are "excessive," "windfall" or "unwarranted" is wrong. Without adequate profits, all capital sources available to high-risk energy development investments would diminish, including loans and capital stock. Without the capital, it would be impossible to develop the energy supplies our nation needs.

In Gulf's case, elimination of all profits would lower the prices of our products less than two cents per gallon on the short term, but this would completely eliminate our ability to expand energy capacity. It would intensify the shortage of energy and ultimately lead to price increases dramatically greater than two cents per gallon. History has eloquently demonstrated that the only effective way of providing any commodity at reasonable prices is to increase the supply to the point where it balances demand. Ultimately, the cost of producing energy must be reflected in the price of energy.

NUCLEAR POWER & PUBLIC SAFETY

The nuclear power industry began when The Atomic Energy Act of 1954 allowed U.S. industry to participate in the development of peaceful applications of atomic energy.

At that time, a few people in government and in industry already were sounding warnings about the energy shortages that now are upon us. And knowledgeable scientists and engineers saw the possibility of producing electricity from the splitting of uranium atoms as an idea whose time had come.

Today, there are 42 nuclear power plants operable in this country—generating 5.6 percent of our electricity and thus helping to conserve our supplies of petroleum products for transportation and chemical uses. There are 56 additional nuclear power plants under construction and another 101 on order but not yet being built. By the end of the century, we might be getting as much as 60 percent of our electricity from nuclear power plants and be well on the way to solving our energy resource problem for centuries.

As nuclear power has developed, so has an opposition to nuclear power. A few of the people opposed are scientists representing a variety of disciplines related and unrelated to nuclear power technology. Many are members of legitimate environmentalist or conservationist organizations. Some others are merely opportunists. Most are unaffiliated citizens who remember the initial use of nuclear energy as a weapon and who are frightened by some of the things they have read and heard.

Today, an organized element of this opposition operates on a nationwide basis using increasingly professional and legalistic tactics, and it is very difficult for people to know whom to believe or how to react.

The subject deserves the most serious and objective consideration. If the nation is going to continue to meet growing energy needs, it seems that there should be an increasing reliance on nuclear power sources for electricity, because it is a presently available alternative to the consumption of fossil fuels for the generation of electricity. On the other hand, if nuclear power represents an unacceptable risk to the public and to the environment, the nation must seek some other alternative.

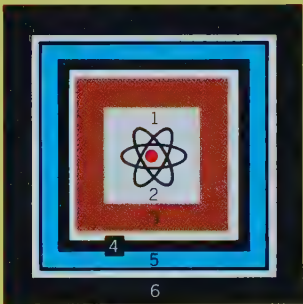
The following pages are intended to cut through the intricacies and the rhetoric of this very complex and highly emotional issue and provide the basic underlying facts and truths as a foundation for rational consideration.

NUCLEAR POWER PLANTS & THE SAFETY RECORD

The nuclear power industry is the only industry ever developed with public safety as its primary concern. The result is that in all the years since the beginning in 1954 not one person ever has been injured (much less killed) from any nuclear-related cause in any commercial nuclear power plant. This includes both the general public and the people who work in these plants.

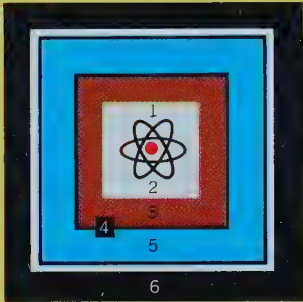
Across the entire industry (which includes military reactors, chemical processing plants, weapons research, and other activities of the Atomic Energy Commission and its contractors) there have been so few nuclear-related fatalities and lost-time accidents that the industry consistently wins National Safety Council awards as one of the safest of all industries in which to work.

MULTIPLE BARRIERS



LWR (Light Water Reactor)

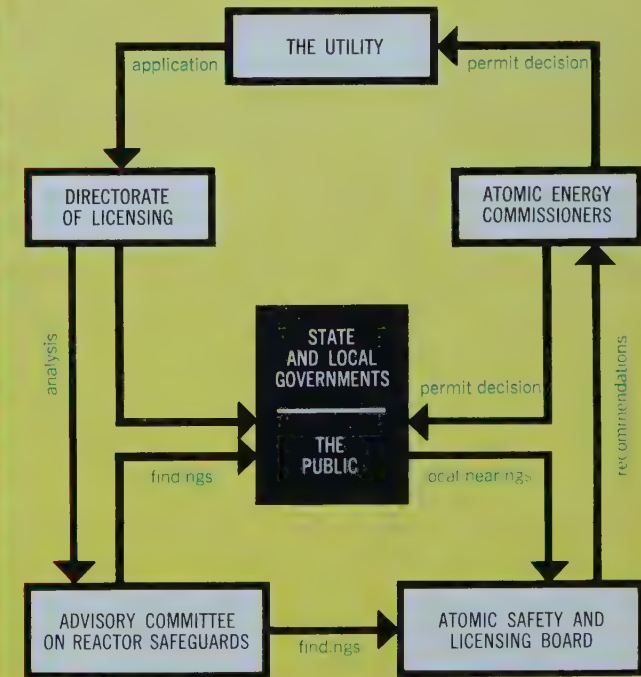
1. Ceramic fuel pellets
 2. Fuel cladding
 3. Pressure Vessel
 4. Steel Lining
 5. Concrete Containment
 6. Reactor Building Containment
- + Exclusion Area around Plant
+ Plant Location at Distance from Population Centers



HTGR (High Temperature Gas-cooled Reactor)

1. Ceramic Fuel Particles
 2. Particle Coating
 3. Graphite Fuel Elements
 4. Steel Lining
 5. Prestressed Concrete Reactor Vessel
 6. Reactor Building Containment
- + Exclusion Area around Plant
+ Plant Location at Distance from Population Centers

LICENSING OF POWER REACTORS



There are several reasons for this enviable safety record:

1. A nuclear power reactor is inherently stable. It is nothing like a bomb and cannot be made to act like a bomb.

2. A power reactor is carefully designed throughout to limit the probability of any sort of reactor accident.

3. A power reactor is equipped with engineered safety features throughout to limit the consequences of any sort of equipment accident or breakdown. These safeguards are made as fail-safe as possible, but the designers assume that even so they somehow might fail and build in back-up safeguard systems, these also designed to be fail-safe.

4. A power reactor also is designed so that if somehow some combination of engineered safeguards should fail there still would be very little likelihood of any leak of radioactivity to the environment. This is accomplished through a series of successive barriers.

5. A power reactor's safety-related features are examined carefully through the licensing and construction processes. The licensing is a two-step procedure. First, the application for a construction permit must contain a Preliminary Safety Analysis Report and an Environmental Impact Report (each consisting of several thick volumes), and the applicant must go through a complex process of reviews and public hearings before obtaining a construction permit. This follows many inspections during construction by the AEC's Directorate of Regulatory Operations.

Interested members of the public are involved in both stages through public hearings and have additional opportunities through an Atomic Safety and Licensing Appeals Board and the courts.

The Advisory Committee on Reactor Safeguards that plays a major role in the reviewing cycle consists of acknowledged experts from a wide variety of technical disciplines. These experts do not work for the AEC, and they do retain consultants and contractors to supplement their own knowledge and to conduct independent evaluations.

The Atomic Safety and Licensing Board consists of experts selected from a panel of highly qualified people employed, at least in part, by the AEC.

The net result of this combination of inherent safety in the laws of physics, engineered safeguards, multiple barriers, safety-oriented licensing procedures, and observation during operation is a facility about as safe as anything made by man could possibly be. In a study presently being conducted for the AEC at Massachusetts Institute of Technology, Dr. Norman Rasmussen has calculated the chance of a reactor core meltdown as ranging from one in a million to one in ten million years for any single plant. The probability of such an accident affecting any large number of people has been put at one in a billion to one in ten billion years.

(One of the worst kinds of theoretical accidents that both designers and critics have occupied themselves with, a reactor core meltdown is the postulated result of a loss of coolant into the reactor followed by failure of all emergency core cooling systems.)

Nuclear Power Plants and Reliability

Electric utilities throughout the nation are convinced that nuclear power plants are not only safe but reliable and economical in producing electricity as well. They base this conviction on experience and have backed it with a capital commitment of over \$80 billion in some 200 nuclear plants currently operating, being built, or in planning stages.

And the fact is that nuclear power plants do have an excellent record of availability. The Edison Electric Institute 1972 study of fossil and nuclear plants covering 1960 through 1972 showed that fossil plants of 600 megawatts or larger averaged 73.2 percent availability, while nuclear plants averaged 76.3 percent. Commonwealth Edison Company of Chicago, which is 32 percent nuclear, is the nation's leader with 25 percent of the nation's installed nuclear capacity. For the twelve months ending November 30, 1973, Edison's on-line reactors averaged 82.6 percent availability; for approximately the same twelve-month period Edison's base-load fossil plants averaged 79 percent. To put this into perspective, a figure of 80 percent is essentially full-time practicable availability, since the other 20 percent is for scheduled refueling and maintenance under normal circumstances. The record shows that the big nuclear power plants perform at least as well as the big new fossil-fueled power plants.

Nuclear Power Plants and Insurance

The Price-Anderson Act, a group of amendments to the Atomic Energy Act of 1954, contains the rules for insuring and indemnifying nuclear utilities against damage caused by a nuclear accident. This law provides for a total indemnity of \$560 million. As available private insurance protection has gone up from \$60 million to \$95 million, the government share has dropped from \$500 million to \$465 million.

When Price-Anderson was enacted in 1957, the private insurance industry agreed to provide liability coverage up to \$60 million, even though there was very little operating experience on which to base actuarial risks. This was the largest single commitment against one major eventuality that private insurance companies had ever made, and it represented a very high degree of confidence in nuclear power. That nuclear power has earned this confidence is proven by the fact that the insurance pools now have returned up to 68 percent of the annual premiums, and the pools now openly praise the "unparalleled" safety record of the "entire nuclear field."

The reason the government backed up the resources of the private insurance companies initially to the extent of \$500 million was to assure that the development of nuclear power as a needed resource would not be delayed merely because of the relatively limited assets of private insurance companies.

Since the utilities pay for Price-Anderson protection, the government share of this insurance is not a subsidy. In fact, the government has made money. To date, the government has collected some \$4 million in fees from the industry and has not had to pay out a cent in damages.

NUCLEAR POWER PLANTS & RADIATION

Because a nuclear power plant doesn't burn anything, it does not contribute to air or water pollution as these terms normally are understood. It does add minimally to the radiation levels already present in nature.

RADIATION IN PERSPECTIVE

1970 Radiation Exposures from Various Sources

Source	Percent of Total Population† Exposed	Annual Average Dose to Population Exposed (mrem/capita)	% of Total Exposure
Natural background	100	130	57.8
Medical diagnostic x-rays	100	90*	40.0
Fallout from weapons tests ...	100	5	2.2
Nuclear power	22	0.01	.044
		Total 225	100.00

*Equivalent to a genetically significant dose of 55 mrem/yr.

†205 million

SOURCE: AMERICAN NUCLEAR SOCIETY

RADIOACTIVITY LEVELS IN LIQUIDS

	(Picocuries/liter)*
Typical nuclear power plant radioactive waste discharge	1-10
Domestic tap water	20
River water	10-100
4% beer	130
Ocean water	350
Whiskey	1200
Milk	1400
Salad oil	4900

*A curie is a unit used to measure radioactivity

A picocurie is a trillionth of a curie A liter is approximately one quart

SOURCE: AMERICAN NUCLEAR SOCIETY

BIOLOGICAL EFFECTS OF SELECTED AGENTS

Factors Tending to Decrease Average Lifetime	Decrease of Average Lifetime
Overweight by 25%	3.6 years
Male rather than Female	3.0 years
Smoking 1 pack per day	7.0 years
2 packs per day	10.0 years
City rather than country living	5.0 years
Actual radiation from nuclear power plants in 1970 ..	less than 1 minute
Estimate for the year 2000 assuming hundredfold increase in nuclear power production	less than 30 minutes

SOURCE: AMERICAN NUCLEAR SOCIETY

Almost everything in the world is and always has been radioactive. The average American routinely receives between 145 and 200 millirems* per year from all sources—including the sun, ground, water, food, buildings, wrist watches, television, and other man-made sources. The contribution of operating nuclear power plants to this annual average of 145-200 mrem is only 0.01 mrem. The average American can also receive that much added radiation by watching color television an extra 18 seconds a day or by moving to an elevation a foot or two higher and therefore closer to the sun.

Statements predicting large numbers of cancer deaths from nuclear power plant additions to background radiation levels have made headlines and, naturally, have alarmed people. The two scientists who originated this prediction based their estimate on an improper use of existing data and on the assumption that every person in the U.S. received 170 mrem per year from nuclear plants for thirty years—a physical impossibility. Using more realistic values for the amount of radiation people receive from nuclear power plants, as reported by the Environmental Protection Agency, the increased cancer death rate could be 0.1 death per year by the year 2000. Thus, the risk of cancer mortality from nuclear power plant operations clearly is negligible.

Public safety has been the primary concern of suppliers, utilities, and government since the very beginning of the nuclear power industry. The original permissible radiation limits established by the AEC were worked out so conservatively and so responsibly that members of the general public are protected by a limit several hundred times lower than a level considered by experts as probably safe. Even so, reactor manufacturers at the outset established design limits 100 times lower than the legal permissible limits—and then built the power plants to operate at radiation release levels much lower even than that.

Recently, the AEC has lowered the permissible radiation exposure to be closer to actual operating levels, and the nuclear power plants continue to operate within the established limit. No member of the public ever has been exposed by a commercial nuclear power plant to radiation levels above the annual limit permitted for the general public.

*A millirem is 1/1000 rem (roentgen equivalent man). A rem is the equivalent in biological effect of one roentgen of X-ray or gamma ray exposure.

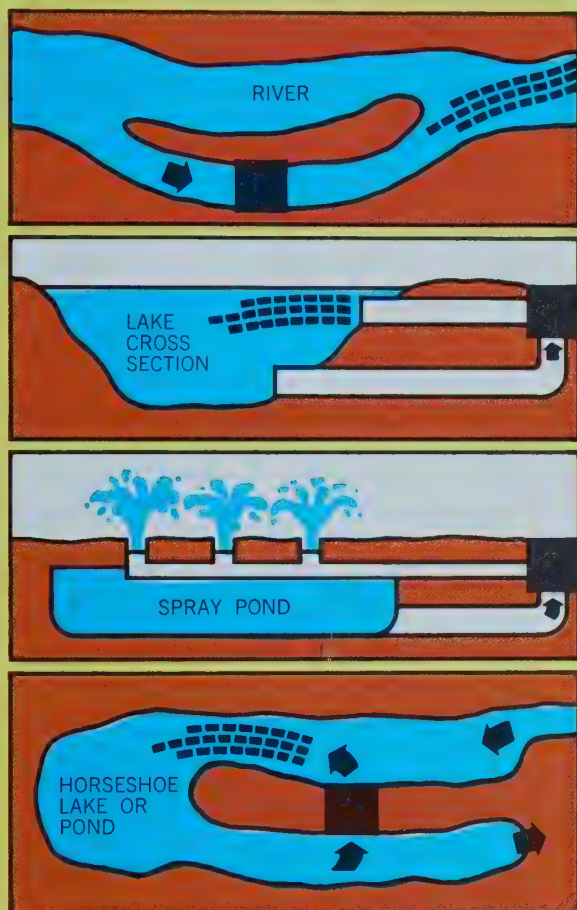
EFFICIENCIES OF STEAM-ELECTRIC POWER PLANTS

Type of Plant	Efficiency (%)
Modern coal, gas, or oil fueled	40
Average* coal, gas, or oil fueled	33
Water-cooled reactors	33
High temperature gas-cooled reactors	39-40
Future breeder reactors (projected)	38-42

*Average of existing plants, which includes some older plants built when attainable efficiencies were lower.

SOURCE: AMERICAN NUCLEAR SOCIETY

LAKE AND SPRAY PONDS



NUCLEAR POWER PLANTS & "THERMAL POLLUTION"

The cooling water used in a power plant usually is drawn from a neighboring lake, river, or ocean. It is carried in its own separate piping system through a condenser where it picks up waste heat from the plant and then is returned to its source at a slightly higher temperature. Depending on a plant's individual environmental situation, the water can be routed first to a cooling tower or cooling pond and reused or held until it is cool enough to be returned to the source. Sometimes, as in the obvious case of a small plant on an ocean, such cooling devices may not be necessary.

The transfer of this waste heat into cooling water sources has come to be called "thermal pollution"—a misleading term because it encourages people to assume falsely that any such transfer of heat is undesirable. Too large a temperature change in an ocean, lake or river can interfere with the food chain and kill fish and therefore is a problem worth serious consideration. But the amount of heat allowed to be added by power plants is limited by individual states and by the Environmental Protection Agency, and the dispersal of the heat is ensured by the design of discharge systems so that the temperature increases from nuclear power plants (and fossil-fueled plants) are carefully controlled at levels that are not harmful to the food chain or to fish.

One indication that this is so is the demonstrated fact that fish and shellfish thrive in the vicinity of nuclear plant cooling water discharge points. Another is that of the 5,738 pollution-caused fish kills from all sources as reported through the Environmental Protection Agency through 1971, only 30 may have been caused by heated water, only nine were attributed to power plants of all kinds, and only one of these was identified as a nuclear power plant. Since the end of that reporting period, there may have been one or two more associated with nuclear power plants.

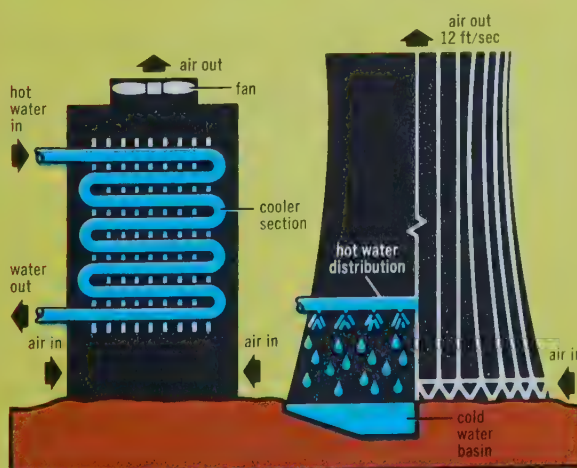
Meanwhile, an increasing amount of research effort is being directed toward developing beneficial uses for that portion of this waste heat high enough in temperature to be of any potential value. Commercial fisheries see in it the salvation of a threatened shrimp and oyster industry. Experimenters are working with spray irrigation of farms and orchards and with increased crop growth through buried pipes. Beyond these are such potential applications as greenhouse agriculture, space heating, air conditioning, freeze drying of produce, and ice-free highways.

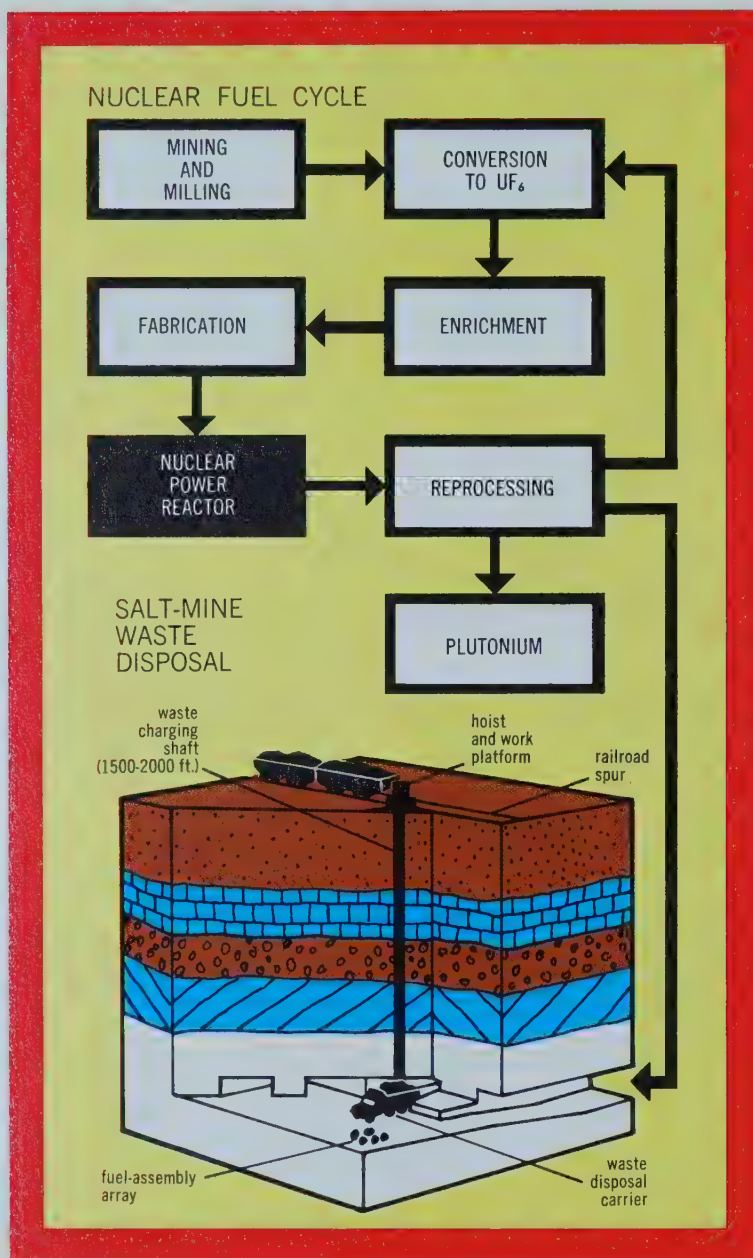
NUCLEAR POWER PLANTS & WASTE DISPOSAL

Highly radioactive wastes from nuclear power plant operation are created in the fuel during the fission process and remain there. Spent fuel, which contains the high-level waste, is not stored in the power plant but is shipped to a commercial or government reprocessing plant. There it goes through a chemical process that separates out some valuable plutonium and recovers some uranium that can be recycled as nuclear fuel.

DRY COOLING TOWER

WET COOLING TOWER





The remainder is stored initially at the reprocessing plant until it settles down chemically, cools off, and loses some of its radioactivity. Then (within ten years) it is solidified and shipped to a federal repository. From that point, the AEC takes full responsibility for storage and eventual disposal. Obviously, this highly radioactive waste material requires special handling in transportation and storage and special permanent disposal methods.

Interim storage for hundreds of years will be in concrete and steel bunkers that will be continually monitored. Of all methods the AEC is studying for permanent unattended disposal, bedded salt deposits seem the most likely possibility. As evidenced by their very existence, the salt deposits are isolated from all sources of ground water. They have not been affected by earth movement for some 200 million years, and they offer ample space for future needs.

Storage and disposal are well within the bounds of today's technology. In addition, there is time to select and develop the

best methods since very little of this waste from nuclear power plants will be available for 10-15 years. Less than one percent of the high-level wastes being stored today is from commercial nuclear power plants. And the volume of this kind of waste is small. All of the high-level solid waste from an entire year's operation of a nuclear power plant big enough to serve a city of a million people could be stored in a space about the size of a small closet. And all of the wastes produced by all the nuclear plants in the U.S. contemplated by the year 2000 could be stored in a cube a hundred feet on each side.

Transportation of these wastes is regulated both by the AEC and by the Department of Transportation. Both agencies analyze shipping cask designs, and casks are tested to remain intact through accidents far more severe than those that could be anticipated in a truck or rail accident.

NUCLEAR POWER PLANTS & DIVERSION OR SABOTAGE

The idea of super-scientific terrorists stealing plutonium and making a bomb or sabotaging a nuclear power plant and somehow destroying a nearby city recently has captured the attention both of critics and of the press. Because the idea has such a strong natural appeal to the imagination, it deserves the most serious application of common sense.

It is true that nuclear materials have been handled, stored and transported around this country ever since the days of the Manhattan Project in the 1940s, and no such frightening thing has happened—yet.

It is true that nuclear power plants and the facilities related to nuclear power represent only a very small part of the industry and activities related to the nuclear fuel cycle. And within this small part, only a few steps in the fuel cycle involve materials with enough fissionable uranium or plutonium in them to require unusual security precautions.

Even so, it also is a fact that diversion of these materials and sabotage of nuclear facilities are possible and that more and better safeguards are therefore necessary.

Because of this, the AEC recently has imposed new and much stricter requirements to protect nuclear materials from theft or diversion, and commercial facilities from acts of sabotage. In the AEC's own words, the new amendments will require "significantly greater protection for air, truck, rail and ocean shipments of nuclear materials; the development and implementation of detailed physical protection plans for nuclear facilities and materials at these facilities; and stricter physical inventory requirements for lesser quantities of nuclear materials and an increase in the frequency and quality of required inventories."

Because this is a new issue so far as those opposed to nuclear power are concerned and because diversion and sabotage are possible, a look at the new AEC requirements in some selected detail seems in order:

Under the new requirements, operators of fuel reprocessing plants and fuel fabrication plants and certain other licensees of the AEC are required (1) to equip and train guards and watchmen to protect against industrial sabotage; (2) to establish a "protected area" enclosed by a physical barrier; (3) to provide for

control of access by individuals, vehicles, and packages to the protected area; (4) to install lighting along the perimeter of the area; (5) to develop a response to intrusion capability; (6) to establish liaison with law enforcement authorities for assistance when necessary; and (7) to establish an emergency, two-way communication link with law enforcement authorities.

These new amendments will strengthen and formalize current measures and should make these facilities secure against anything short of a determined armed intrusion in numbers.

The new amendments include the following protection requirements for nuclear materials being shipped by truck or rail within the U.S. (again in the AEC's own words):

"Truck or trailer shipments must be accompanied by an armed escort traveling in a separate vehicle unless trucks or trailers specially designed to protect against theft or diversion are used. In addition, shipments will be made on a point-to-point basis with no loading or unloading of other cargo between these points. Additional measures to help assure prompt detection of an actual or attempted theft or diversion include the use of radiotelephone calls or conventional telephone calls at least every two hours between the truck and the licensee or his agent. Where radiotelephone coverage or conventional telephones along the planned route are not available, conventional telephone calls must be made at least every five hours. Trucks are to be marked on the top and sides with identifying letters or numbers.

"Other safeguard measures include use of preferential routing to avoid trouble areas; continuous surveillance of truck transport and transfer points; and preplanning shipments to assure delivery at a time when the receiver is available to accept the material.

"When rail transportation is used, the shipment must be escorted by two armed individuals, in the shipment car or an escort car of the train, who would keep the shipment cars under observation and would detrain at stops when practicable in order to guard the shipment cars and check car or container locks and seals. Radiotelephone communications are required to be maintained with a licensee or his agent every five hours or less and at scheduled stops in the event that radiotelephone coverage was not available in the last five hours before the stop."

There has been no hijacking of nuclear materials thus far in the history of the industry, and these newly required precautions should help assure that there will be none.

NUCLEAR POWER IN CONTEXT

Nuclear power is an emotional issue. And because it is, everyone owes it to himself to weigh it as unemotionally as he can and to judge the facts in the contexts of the nation's need for energy and of the concept of acceptable risk.

There can be no doubt that the energy situation in this country is real. The reserves of oil and gas are being used up faster than new supplies are being found. The use of the nation's abundant coal is subject to severe environmental restrictions. Essentially all the hydro power sites are already in use. Alternate sources of energy—such as nuclear fusion, synthetic fuels, solar energy, geothermal power—are either too far in the future or too limited to meet the nation's near-term needs.

Conservation measures are desirable and necessary but, in themselves, inadequate. It seems clear that the irreducible energy needs require the most efficient and most appropriate use of all sources of energy available today. This includes nuclear fission to help conserve petroleum resources for transportation and chemical uses—particularly since nuclear power has proven to be both safe and environmentally clean for the short term and holds out for the longer term the promise of practically limitless power resources.

Admittedly, there is a small risk involved in the use of nuclear power—just as there is a risk involved in everything that man makes or does or comes in contact with. People understand that in a general way and routinely accept the risks involved in order to get or to do something considered worth the risk.

People in the United States drive automobiles and accept 55,000+ deaths per year from auto accidents. They live in cities and accept 20,000+ deaths per year from air pollution. They swim for recreation and accept 7,000+ deaths per year from drowning. They fly and accept 1,500+ deaths per year from aircraft accidents. They use electricity and accept 900+ deaths per year from electric current.

In comparison with these acceptable risks, nuclear power, in the seventeen years that power reactors have been operating in this country, has offered a record of zero deaths (or even injuries) from nuclear-related causes. Based on the AEC's forecasts of 1,000 reactors operating by the year 2000, the MIT studies cited earlier calculate statistically that the U.S. might have one major accident somewhere between every 1,000 and 10,000 years.

Different types of nuclear power reactor systems have different environmental and safety-related characteristics. A future article will describe the High Temperature Gas-cooled Reactor (HTGR), the reactor type made and sold in this country by General Atomic Company, and will indicate its environmental and safety-related features.

ACCIDENTAL DEATH STATISTICS FOR 1972—UNITED STATES

Type of Accident	Total Deaths	Deaths per 100,000 Population
Motor vehicle	56,600	27.2
Falls	17,400	8.4
Drowning	7,600	3.6
Fire, burns & deaths assoc. with fire	6,800	3.3
Suffocation—ingested objects . . .	3,900	1.9
Poisoning (solids & liquids)	3,700	1.8
Firearms	2,400	1.2
Poisoning by (gases and vapors) . .	1,600	.8
All other types (mechanical, suffocation, struck by falling object, electrical current, air and rail transportation, medical complications, excessive cold, excessive heat, water transport, lightning, etc. . .	17,000	8.2

SOURCE: NATIONAL SAFETY COUNCIL

GULFCREST NO LEAD A NEW GASOLINE

On November 27, 1973, Gulf announced that it was bringing a new gasoline, Gulfcrest no lead, on the market and that the Company's popular Gulftane low lead gasoline would be discontinued to permit the orderly phase-in of the new fuel.

The phase-in was begun in some areas almost immediately and will be completed in nearly all areas in which Gulf operates by July 1 of this year. July 1 is the deadline set by the Environmental Protection Agency (EPA) for the availability at all locations selling 200,000 gallons or more a year of a lead-free gasoline of at least 91 octane rating for use in the 1975 model automobiles.

The bare announcement was all that was said at the time—the tip of the iceberg, as it were, relative to the full story of what it meant to bring a new product on the market and what was required to manufacture Gulfcrest no lead and move it through the Company's vast distribution systems from refineries to bulk terminals to service stations.

A new gasoline cannot be created overnight. As simple as it may seem, an unleaded gasoline involves much more than turning a few valves here and there to redirect the stream and eliminate the addition of lead compounds. On the contrary, the changes necessary for producing and marketing Gulfcrest no lead were significant even when considering an operation of the magnitude of Gulf.

A new refinery processing unit was built and existing equipment modified. Moreover, provision had to be made for product storage and transportation which called for special in-plant piping and tankage to keep the new unleaded product isolated. And at the other end of the supply line, the service station—approximately 20,000 of them—there were a number of things to be done to effect an orderly change-over from Gulftane low lead to the new unleaded product, Gulfcrest.

As early as the last quarter of 1970, Gulf began making plans for the manufacture and marketing of an unleaded gasoline to replace Gulftane. At that time the Company was convinced that it would be necessary eventually to produce a no-lead product to satisfy Government regulations set down by the Clean Air Act of 1970. Also, automobile manufacturers claimed that the catalyst mufflers then being developed to meet exhaust emission standards for 1975 automobile engines could not tolerate leaded gasolines, that even the minute quantities contained in low-lead gasoline would, after a short period of operation, "poison" the catalyst and render the new muffler ineffective. Therefore, car makers were calling on refineries to produce unleaded fuels.

In view of these considerations and the prevailing attitude vis-a-vis lead in gasoline, production of Gulftane low lead was discontinued and the phase-in of Gulfcrest no lead was begun as a carefully planned, orderly conversion. Gulfcrest no lead, as produced at present, meets or exceeds all the EPA requirements for an unleaded product. Some automobile manufacturers have estimated that 1975 model cars, equipped with catalyst mufflers, will get significantly better mileage with a gasoline like Gulfcrest no lead.

As this is being written, nearly 85 percent of the areas in the U. S. served by Gulf have the new Gulfcrest no lead. By July 1 all Gulf service stations (with the possible exception of a few low-volume outlets of less than 500 gallons a day) will be supplied with the new unleaded gasoline.

Just as the introduction of Gulfcrest was made without fanfare, the change-over from the manufacture of Gulftane to the new gasoline was accomplished with little publicity, yet it represented a great deal of effort and the expenditure of more than \$20 million for new equipment and necessary modification at the Company's eight U.S. refineries.

The gasolines sold at service stations are in reality a complex mixture of up to 20 or more refinery gasoline streams each with its own quality characteristics—octane rating, boiling point, vapor pressure, etc. When these streams are blended, the resulting mixture, unfortunately, will not exhibit a "normal average" of all properties and characteristics. This anomaly occurs, owing to the physical/chemical reactions of the various streams on one another. So the task of determining the proper component blends when making several different grades of gasoline is an extremely complex operation, requiring the use of computers to arrive at the best solutions.

The point to be made is that a change in specification of any one grade of gasoline usually requires that the blends of all grades be redesigned.

As lead anti-knock compounds are removed from gasoline, octane ratings can be maintained only by upgrading relatively low-quality stocks into high-quality stocks. To accomplish this upgrading "refinery severity" must be increased and additional processing equipment provided to achieve the higher octane required. (Refining severity means additional processing, usually under conditions of higher temperature and pressure, with a resultant loss of yield.)

Once a no-lead gasoline is produced along with gasoline containing lead, it is necessary to provide a totally segregated

distribution network within the refinery to assure that there is no contamination from the other products. And as the unleaded gasoline leaves the refinery on its way to service stations, every precaution is taken to assure its purity. (EPA has set stringent quality control restraints governing lead-free gasolines which allow a maximum of 0.05 grams of lead contamination at the service station pump.)

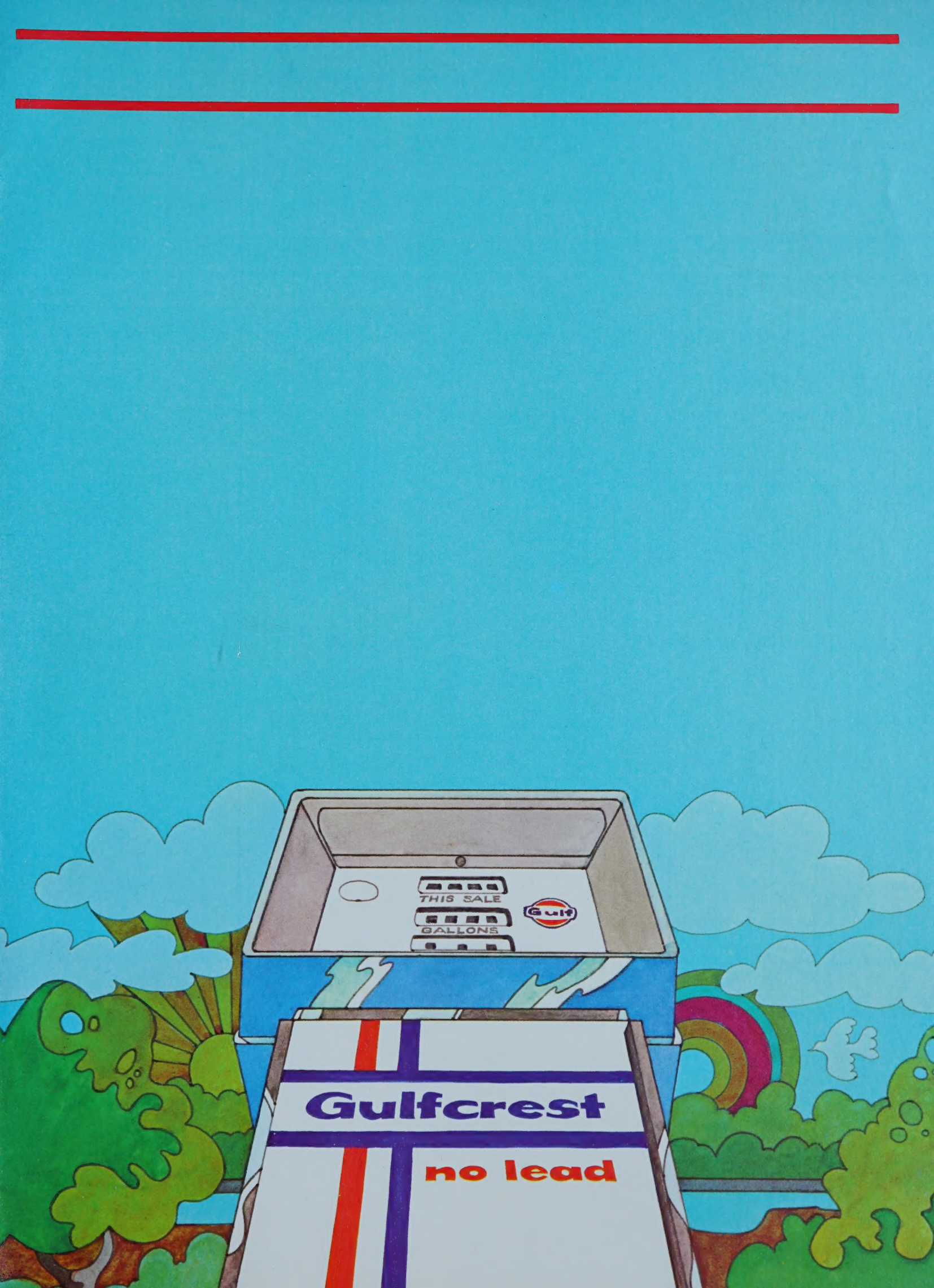
The complexity of today's petroleum product distribution systems comprising tankers, barges, pipelines, tank trucks, and railroad tank cars is enormous. Most of these modes of transportation are used interchangeably to deliver various grades of leaded and unleaded gasolines as well as jet fuels, kerosene, and heating oils. A contamination of as small as one or two percent of leaded gasoline could conceivably result in too much lead for the lead-free product. When viewed in the light of the facts of large-volume distribution of product nationwide, the problems of providing an uncontaminated, lead-free gasoline become evident.

As early as October of last year, Gulf refineries began tests of the special blending techniques and shipped lead-free gasolines in batches through certain refinery and pipeline distribution systems to determine the extent to which lead contamination from its leaded fuels, No-Nox and Good Gulf, occurred. In all tests, it was found that the lead picked up by a batch of unleaded gasoline was well below the limit set by the EPA.

Gulf's Marketing Department has forecast the demand for Gulfcrest no lead at approximately 5 percent of Gulf's total gasoline production, or about one million gallons a day. Current forecasts project demand growth to range from seven to 10 percent per year, so that by 1980 Gulfcrest no lead may account for 50 to 65 percent of the Company's total gasoline sales.

Although the Company has complied with the rulings of the Environmental Protection Agency in making available a lead-free gasoline, Gulf's position as enunciated by James E. Lee, President, is that "we need to keep the lead in gasoline—to provide maximum efficiency in the production and use of gasoline."

It is estimated that the nation will suffer an average loss of approximately 1.5 billion gallons of gasoline annually through 1985 owing to the increased processing severity necessary to provide a lead-free product. The Company urges that the subject of lead in gasoline in relation to the nation's fuel requirements be re-examined so that a more realistic solution can be found.



Gulfcrest

no lead

